

Alfetta 2.0 Turbo-Diesel

VDT-I-ALF. 006 En
7.1980

Auxiliary starting device with
Glow-duration unit 0 333 402 002
Power relay 0 334 804 001

"R"-type sheathed-
element glow plug 0 250...

For additional information see "New Product" VDT-I-333/1 En

1. Necessary test equipment

Voltmeter		
e.g.	MOT 002.00	0 684 000 200
Ohmmeter		
e.g.	ETE 014.00	0 684 101 400

2. Trouble-shooting program

2.1 Aim of trouble-shooting program

While making use of all appropriate test equipment, this program is designed to help workshop employees quickly detect causes of trouble on engines with a pre-heating system.

2.2 Test sequence

The test steps given on the left-hand side of the trouble-shooting program contain test information and test specifications. If the test step has a negative outcome, consult the boxes on the right-hand side opposite for corresponding repair instructions.

3. Workshop information

3.1 We recommend that the "R"-type sheathed-element glow plugs be replaced every 45,000 km.

Note: If the fuel-injection pump is incorrectly adjusted, this may considerably reduced the service life of the sheathed-element glow plug.

3.2 In order to prevent the glow-duration unit from being irreparably damaged, the start repeater lamp must be fitted with a 12 V max. 2 W bulb.

3.3 For each repeat start the glow-plug and starter switch must, in order to obtain renewed pre-heating, first of all be turned to position GAR. and then to position MAR. This makes it possible for the safety switch-off circuit fitted in the glow-duration unit to be re-activated.

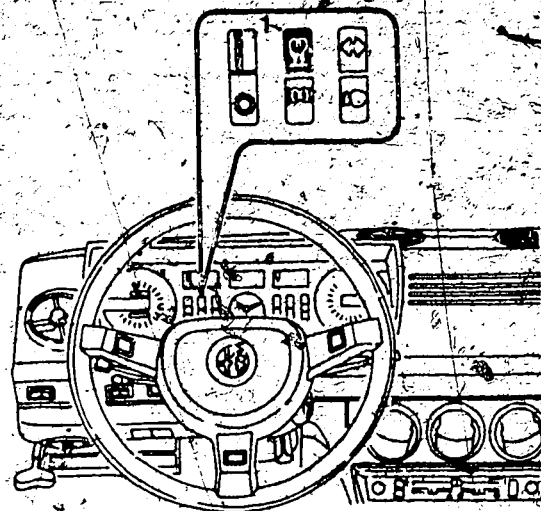


Fig. 1 1 = Start repeater lamp

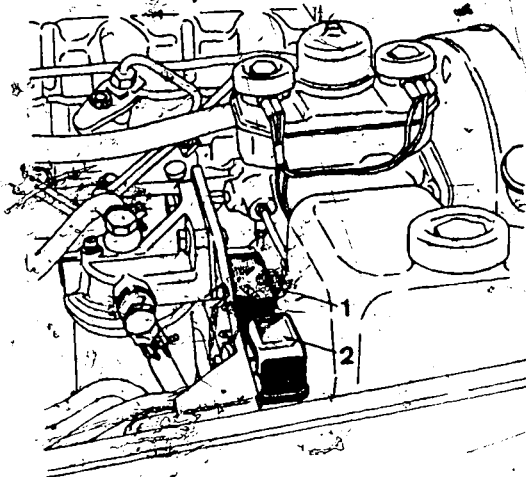


Fig. 2 1 = Glow-duration unit
2 = Power relay

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Trouble-shooting program

Before testing, make sure of the following:

Battery fully charged, compression O.K. (if necessary, check compression loss), fuel supply system and fuel-injection system O.K.

Starting motor turns and engine fails to start or starts only with great difficulty.

yes

Check voltage supply to "R"-type sheathed-element glow plugs. Connect voltmeter to "R"-type sheathed-element glow plug and to ground. Turn glow-plug and starter switch to position GAR, and then to position MAR. A minimum voltage of 10 V must be indicated for at least 20 seconds (temperature-dependent). After this time the system switches off automatically. Caution: If the measurement has to be repeated, then the glow-plug and starter switch must be turned to position GAR, and then to position MAR.

Minimum voltage present?

yes

Check start repeater lamp. Turn glow-plug and starter switch to position GAR, and then to position MAR. Start repeater lamp must light up.

Does start repeater lamp light up?

yes

Check pre-heating time. Turn glow-plug and starter switch to position GAR, and then to position MAR. The pre-heating time (start repeater lamp lit up) must be

30...40 seconds at an ambient temperature of 0°C

23...33 seconds at an ambient temperature of +10°C

17...27 seconds at an ambient temperature of +20°C

10...20 seconds at an ambient temperature of +30°C

3...13 seconds at an ambient temperature of +40°C

Pre-heating time (seconds) O.K.?

yes

Continued on page 4

1. If no voltage, then check cable from "R"-type sheathed-element glow plug to power relay term. G for open circuit. Eliminate open circuit. If no open circuit, then proceed on page 3 at program step "check voltage at glow-duration unit".
2. Voltage below 10 V, then check power circuit (positive terminal of battery) as well as term. 30 and G of power relay for voltage drop. Eliminate voltage drop.

1. Check cable from glow-duration unit term. K to ground including start repeater lamp for open circuit. Eliminate open circuit.
2. Check ground cable from term. 31 of glow-duration unit for open circuit. Eliminate open circuit.
3. Check cable from power relay term. G to glow-duration unit term. G for open circuit. Eliminate open circuit.
4. If Points 1 to 3 O.K., then replace glow-duration unit.

Replace glow-duration unit.

Check voltage at glow-duration unit term. 15.

Connect voltmeter to glow-duration unit term. 15 and to ground.

Turn glow-plug and starter switch to position GAR, and then to position MAR. The voltmeter must indicate battery voltage.

Battery voltage present?

yes

Check voltage at glow-duration unit term. 86.

Connect voltmeter to glow-duration unit term. 86 and to ground.

Turn glow-plug and starter switch to position GAR, and then to position MAR. The voltmeter must (for a limited period of time) indicate approx. battery voltage.

Battery voltage present?

yes

Check voltage at power relay term. 86.

Connect voltmeter to power relay term. 86 and to ground.

Turn glow-plug and starter switch to position GAR, and then to position MAR. The voltmeter must (for a limited period of time) indicate approx. battery voltage.

Battery voltage present?

yes

Check winding and ground cable of power relay.

Connect ohmmeter to power relay term. 86 and ground.

Resistance approx. 18 Ω .

Resistance O.K.?

yes

Check power relay.

Connect voltmeter to power relay term. 30 and ground.

The voltmeter must indicate battery voltage.

Battery voltage present?

yes

Voltage at "R"-type sheathed-element glow plug now present?

yes

Proceed on page 2 at program step "check start repeater lamp".

no

Check cables from positive terminal of battery via glow-plug and starter switch to glow-duration unit term. 15 for open circuit. Eliminate open circuit.

no

Replace glow-duration unit.

no

Check cable from glow-duration unit term. 86 to power relay term. 86 for open circuit. Eliminate open circuit.

no

1. Check ground cable from power relay term. 85 for open circuit. Eliminate open circuit.
2. If no open circuit, then replace power relay.

no

Check cable from positive terminal of battery to power relay term. 30 for open circuit. Eliminate open circuit.

no

Replace power relay.

Check safety switch-off circuit.
Connect voltmeter to "R"-type sheathed-element glow plug and to ground. Turn glow-plug and starter switch to position QAR, and then to position MAR. The voltmeter must indicate voltage for

45...70 seconds at an ambient temperature of 0°C

38...64 seconds at an ambient temperature of +10°C

32...59 seconds at an ambient temperature of +20°C

25...54 seconds at an ambient temperature of +30°C

18...48 seconds at an ambient temperature of +40°C

After the specified time the voltmeter must indicate 0 V.

Voltmeter at 0 V after specified time?

no

Replace glow-duration unit.

yes

Check pre-heating when starting motor is operated.

Connect voltmeter to "R"-type sheathed-element glow plug and to ground. Turn glow-plug and starter switch to position AVV.

Voltmeter must indicate a voltage of 6...10 V.

Voltage present?

no

1. Check cable from glow-plug and starter switch term. 50 to glow-duration unit term. 50 for open circuit.
Eliminate open circuit.

2. If Point 1 O.K., then replace glow-duration unit.

yes

Check "R"-type sheathed-element glow plugs

Check "R"-type sheathed-element glow plugs individually for continuity using ohmmeter.
O.K. ?

no

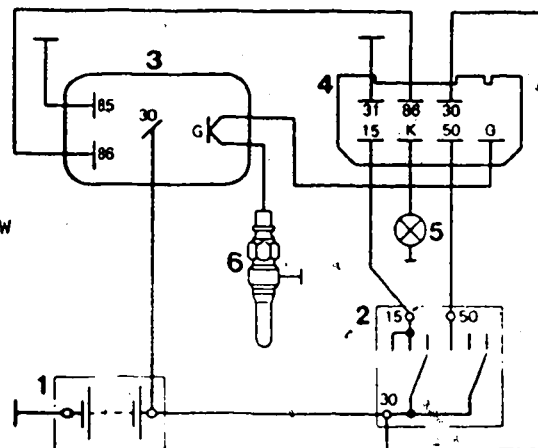
Replace "R"-type sheathed-element glow plug

yes

Pre-heating system O.K.

- 1 Battery
- 2 Glow-plug and starter switch
- 3 Power relay
- 4 Glow-duration unit
- 5 Start repeater lamp (12V 2W)
- 6 "R"-type sheathed-element glow plugs

Terminal diagram



ALFA ROMEO, ALFA 90
WITH TRIP COMPUTER
Incomplete display

Electrical equipment

VDT-I-ALF 007/En


3.1985

In trip computers 0 263 001 028, .. 029, installed in the Alfa 90, the following fault may occur:

Incomplete numbers in display.

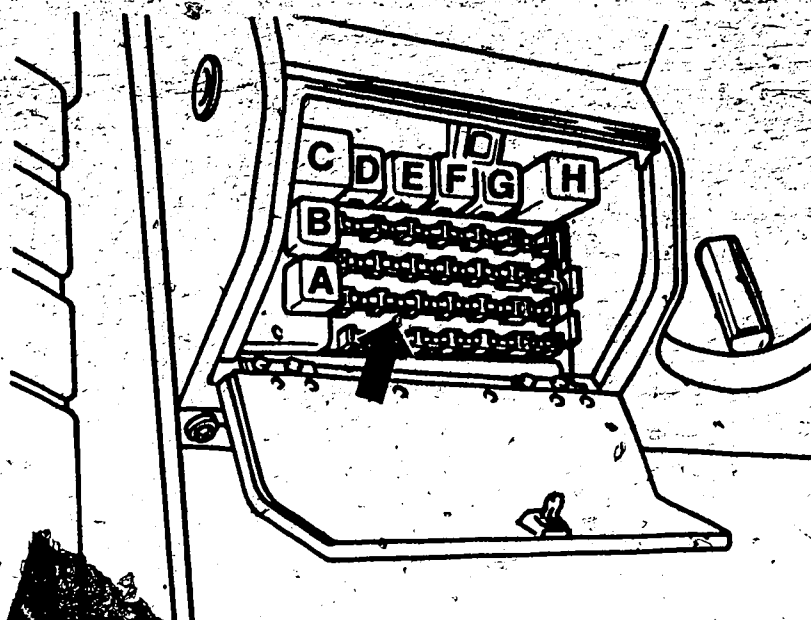
Possible causes of trouble:

1. Starter battery not connected properly.
(Battery was not connected speedily, i.e. without sparking).
2. Brief interruption in supply voltage.
3. Sharp voltage dip when starting with weak battery.
4. Excessive temperature, > 65°C.

	Motor Vehicle Service Information	

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For points 1 - 3, with the battery connected, de-energize the trip computer by removing fuse 14 (see picture, arrow).

After waiting for 2 minutes, re-insert fuse. In the case of trouble because of point 4 (high temperature), full operation is restored when the temperature drops below 65°C.

In none of the aforementioned cases is there any permanent damage to the trip computer.

Please direct questions and comments concerning the contents to our authorized representative in your country.

Motor Vehicle Service Information



ALPINA B 6 2.8
with L-Jetronic

VDT-I-ALR 001 En
1.1981

The firm of Alpina, Burkard Bovensiepen KG, 8938 Buchloe, deliver a special vehicle with the above mentioned designation.

The vehicle is based on the BMW 3.. series, BMW 2.8 i engine with L-Jetronic.

The L-Jetronic equipment corresponds to that in the BMW 528 i Europa, 1980 model.

The Original Bosch control unit 0 280 001 108 forms part of the L-Jetronic equipment in this vehicle.

Various functions on this control unit have been modified by Alpina on their own responsibility.

This results in the following:

Due to the modification Bosch can no longer be held liable for a warranty claim for the control unit.

If customers should approach you with a warranty claim, they should be directed to Alpina.

The Bosch name plate on the control unit has been covered over and bears the Alpina part number 13 56 601.

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A7

A7
95

AUDI 80 GTE, FOX, 100/5 E
with K-Jetronic

VDT-I-AUD 008 En
2.1979

In these vehicles with K-Jetronic, Audi use a non-return valve screwed onto the output side of the filter between the fuel filter and the fuel distributor. The spring of the non-return valve can wear away and pieces of spring wire can get into the plunger-type pressure regulator of the fuel distributor and cause trouble. It can, for example, block the plunger-type pressure regulator or damage its O-ring.

In this case no guarantee claim can be accepted.

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AUDF 100/5 E, 4000 (USA)

VDI-I-AUD 011 En

Hot-start difficulties

12.1979

Hot-start difficulties with vehicles of the above mentioned types can be caused by faults in the fuel accumulator. The fuel accumulators concerned are 0 438 170 019 and 020 with dates of manufacture FD 924 and 925 and with works no. 050.

Fuel accumulators with date of manufacture FD 924 or 925 without works no. 050 and those with works no. 050 and with a yellow dot on the fitting side are in working order.

The accumulators which must be described as defective should be checked as follows:

Accumulators not yet fitted

Test with compressed air: Apply 4 bar pressure for approx. 5 seconds to one accumulator fitting. In doing so close off the other fitting.

Accumulators in good condition: After loosening the compressed-air connection a whistling and then a clicking noise should be heard for a few seconds.

Defective accumulators: After loosening the compressed-air connection only a whistling sound is to be heard.

Accumulators already fitted

Drive the fuel pump by bridging the electrical safety circuit (see vehicle-related test and repair instructions).

Unscrew the bleeder screw in the base of the fuel accumulator.

Using a rod as a depth measure, e.g. welding rod approx. 2 mm dia. and approx. 120 mm long, measure the depth of insertion. The fuel pump must operate for approx. 1 min. before and during the measuring procedure. The measuring rod must be inserted straight into the accumulator (if necessary remove the accumulator support).

Insertion depth: smaller than 85 mm = accumulator in working order,
larger than 92 mm = accumulator defective.

Guarantee

Claims for defective accumulators should be made as usual during the guarantee period.

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AUDI 80 GLE (4000 USA)

VDT-I-AUD 012 En

Fuel pump noises

12.1979

In the Audi 80 GLE up to chassis no. 8 192 202 910, date of manufacture 4.79, the fuel pump may produce noises if the tank contains less than 10 l of fuel. The fuel gauge is then already in the red range.

Cause

The fuel-return pipe is above the level of the fuel. Air bubbles are formed in the return flow of fuel which are then sucked in by the fuel pump.

AUDI have already remedied this complaint in the series.

Remedy

Inform the customer of the cause of the problem and make him aware of the need to refuel in good time. The noise will then be avoided.

If necessary refer the customer to an AUDI representative.

AUDI 100 - 5 D (5000 DIESEL)

VDT-I-AUD 014 En

Starting motor difficulties

12.1979

Up till September/October 1979 the Audi 100 - 5 D (5000 Diesel) was fitted with starting motor 0 001 362 070 (trade .. 069).

Due to contact oxidation on the connecting bolt 30, the solenoid switch of this starting motor has failed on several occasions.

The fault is that the starting motor only engages but does not crank.

Since September/October 1979 the Audi 100 - 5 D (5000 Diesel) has been fitted with starting motor 0 001 362 078 (trade .. 077).

This starting motor is distinguished from its predecessor by the solenoid switch with silver contact on the connecting bolt.

If starting motor 0 001 362 070 (.. 069) fails due to the damage described, then the solenoid switch is to be exchanged for solenoid switch 0 331 402 039 with silver contact. At the same time the starting motor must be renumbered 0 001 362 078 (..077).

Starting motor 0 001 362 070 or ..069 is still being delivered for the VW-LT and the Volvo diesel.

Guarantee claims

We are concerned here with vehicle-specific damage. Bosch cannot therefore be held liable for the claim.

AUDI QUATTRO

VDT-1-AUD Q17 En

with electronic ignition system
and K-Jetronic

11.1980

Motor	: 5-cylinder, turbocharged with charge-air cooling
Power output	: 147 kW (200 DIN HP)
Firing sequence	: 1-2-4-5-3
Dwell angle	: 150° - 500° crankshaft BTDC (non-adjustable)
Engine-speed limitation	: 6,750 min ⁻¹ ± 10 min ⁻¹
Idle-speed stabilization	: Within the range 600 min ⁻¹ to 940 min ⁻¹
Rated speed	: 5,500 min ⁻¹

Functioning of the ignition system

As regards its design, the ignition system corresponds to the TCI-h system. It is provided with an additional control unit (from Hitachi Co) for spark advance and ignition point.

The following information is transmitted to the control unit by a number of sensors:

- Engine speed
- Ignition-point mark
- Throttle-valve position
- Intake-air temperature
- Intake-manifold pressure

Depending upon the particular load mode in which the vehicle is operating at a given instant, the signals from the sensors are used to select the appropriate ignition point from the ignition-point map stored in the control-unit memory. The ignition is then triggered accordingly (similar to Bosch "Motronic").

The ignition distributor (without vacuum unit, without centrifugal advance mechanism) is equipped with an integrated hall generator and a trigger wheel with only one opening and serves as the reference-mark sensor for TDC of cylinder 1, and for high-voltage distribution.

The TCI-h trigger box (hybrid design) is controlled from the Hitachi control unit. It serves as the final stage for the switching of the ignition-coil primary current (approx. 7...8 A), and for control of the dwell angle.

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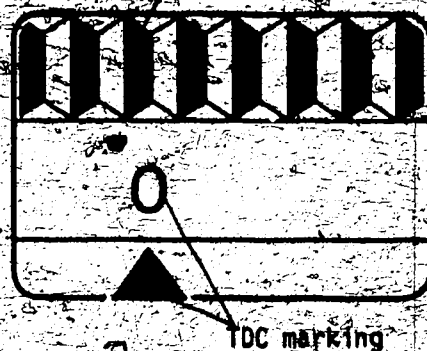
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Setting the ignition point

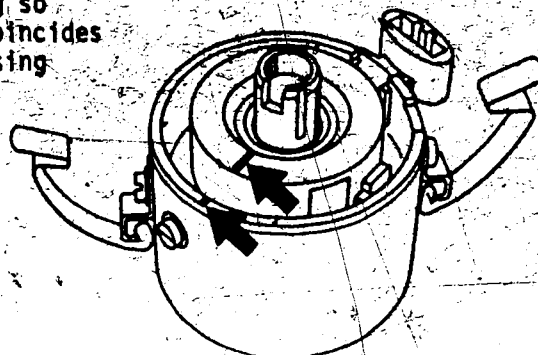
The ignition point is set with the engine stationary.

Set cylinder 1 to TDC (reference marks on ring gear and housing).

Check: The reference mark on the camshaft timing gear must coincide with the upper edge of the valve-cover gasket.



Turn the ignition-distributor housing so that the mark on the trigger wheel coincides with the mark on the distributor housing (arrows).



K-Jetronic

The K-Jetronic installation corresponds to that of the Audi 200-5 T and is fitted with a charge-air cooler (heat-exchanger). In order to avoid starting difficulties when hot, the vehicle is fitted with an extra blower for cooling the injection valves. The blower is switched on at approx. 100 °C and off at approx. 94 °C thermostatically.

An impulse relay triggers the start valve during each "hot" start. The start valve injects, intermittently, extra fuel into the intake manifold.

Repair

The air-flow sensor can be repaired using the conventional after-sales service tools. The primary-pressure regulator is the only component that can be repaired on the fuel distributor.

Technical documentation

Equipment	: 9.80 on microfiche
After-service sales tools (KD-tools)	: KD-EP 13 D ... 18 D
Basic instructions	: VDT-W-438/500
Vehicle-specific instructions	: VDT-W-438/537
Test specifications	: VDT-W-438/1036

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AUDI

VDT-I-AUD 025 En

Ignition distributor with Hall generator 0 237 02. ...
Modification to distributor connector
and plug housing

4.1981

Since October 1980 modifications have been made to the ignition-distributor connector and the plug housing on Audi vehicles. This means that in the case of replacements the new ignition distributor (with new plug housing) can no longer be connected to the old distributor connector (vehicles with wiring harness).

Remedy

Using a file, carefully remove the two long narrow guide noses on the ignition-distributor connector - old design (Fig. 1). Please note: The new distributor connector fits into both the old and the new ignition-distributor plug-housing.

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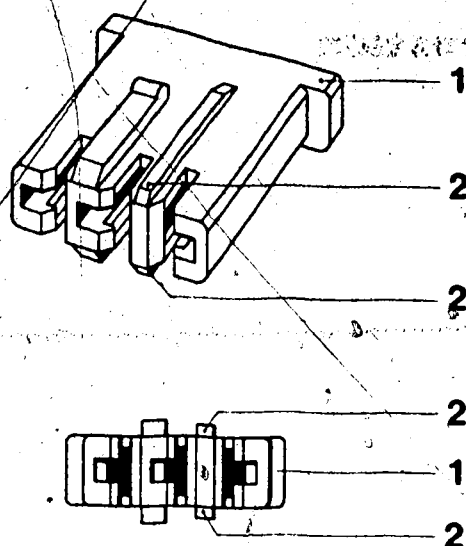


Fig. 1 old design

- 1 = ignition-distributor connector
- 2 = long, narrow guide noses to be removed

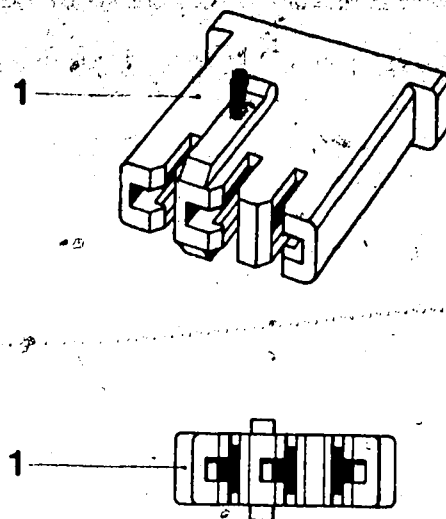


Fig. 2 new design

- 1 = ignition-distributor connector
without long, narrow guide
noses

AUDI 100, 200, 5000
with K-Jetronic

VDT-I-AUD 026 En

9.1981

Failure of the electric fuel-pump

In the above mentioned Audi vehicles a strainer (prefilter) is fitted in the fuel tank.

Aggressive fuel components (e.g. methanol) can lead to this strainer swelling and then moving upwards.

Consequences:

Due to the missing seal between the filter and the fuel-tank floor, dirt already in the fuel tank can therefore be sucked in and cause damage to the electric fuel pump.

Remedy:

Dismantle the sensor for the fuel indication. This work is best carried out with the fuel tank nearly empty.

Replace the defective strainer with Audi no. 810 201 511E with a new strainer no. 431 201 511. The strainer is not made by Bosch.

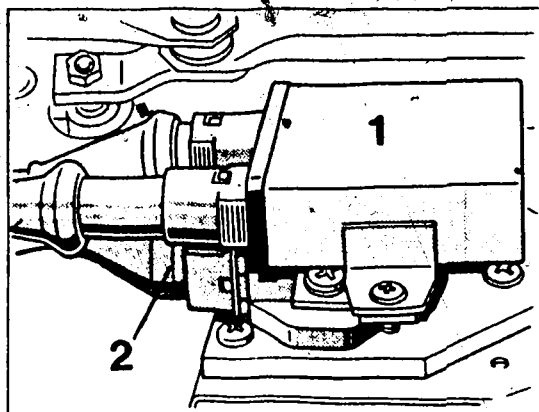
Warranty or fair deal claims for electric fuel pumps which have failed due to a defective strainer, cannot be accepted.

AUDI 100 (5000), 200 WITH 2.2 1 FUEL-INJECTION ENGINE
IMPEDANCE TRANSFORMER
(Volkswagen AG replacement part)

VDT-I-AUD 027 En

12.1981

In order to avoid interference voltages and flashovers (e.g. on the tachometer), an impedance transformer has been fitted in the Audi 100 (5000)/200 since January 1981.



1 = Impedance transformer
2 = TI-h trigger box

The impedance transformer is mounted on the TI-h trigger box and has a grey or black housing.

When tests or adjustments are carried out on the engine the impedance transformer must not be disconnected. It does not affect the ignition timing adjustment.

Before trouble-shooting work on the TI-h system, however, the impedance transformer must be disconnected. The two plugs should be connected together.

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AUDI QUATTRO

Change of indicator lamps in cockpit
instrument 0 263 220 008

Electrical equipment

VDT-I-AUD 029 En

4.1984

In the event of failure of cockpit instrument 0 263 220 002 it is replaced by version ..008. In this version the trailer turn-signal indicator lamp is replaced by an ABS indicator lamp.

If the failed cockpit instrument had a trailer turn-signal indicator lamp, this must be mounted separately when installing version ..008.

Trailer turn-signal indicator lamp as well as ABS indicator lamp are installed potential-free in the cockpit instrument.

Published by:

Robert Bosch GmbH
Division KH
After-Sales Service Department for
Training and Technology (KH/VSK)

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AUDI QUATTRO

Electrical equipment

Change of voltage transformer on cockpit
instruments 0 263 220 001/002,
..005/006, ..007/008

VDT-I-AUD 030 En

7.1984

supersedes edition 4.1984

New technologies have necessitated circuitry modifications to the voltage transformer.

When installing a new voltage transformer, therefore, pay attention not only to its Part No., but also to the modification index (e.g. 02) given next to the FD of the cockpit, see table below.

Cockpit instru- ment	Old voltage trans- former	Up to modifi- cation index	New voltage trans- former	As of modifi- cation index
0 263 220..	2 260 590..		2 260 590	
001	301	without index	301	without index
002	302	without index	302	without index
005	301	04	304	05
006	302	04	305	05
007	301	01	304	02
008	302	01	305	02


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In the case of incorrect installation, e.g. new voltage transformer on old cockpit or old voltage transformer on new cockpit, neither the voltage transformer nor the cockpit will be destroyed. They simply will not work.

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Not to be communicated to any third party

AUDI VEHICLES

Register to
File
Identity

Vehicles

Interruption in fuel supply

VDI-1-AUD 031 En

with fuel filter

7.1986

0 450 905 066, 091, 093, 601

On the above-quoted fuel filters, as of FD 550/551 the inlet has been provided with a protective countersink to prevent damage to the sealing surface.

Due to inlet-union screws of an overall length of greater than 31 mm the latter are able to rest on the inner plastic closure cap on the intake side of the filter.

As a result, the fuel flow is impeded or interrupted at this point.

Corrective action:

Replacement of inlet-union screw.

Suitable inlet-union screw: 2 91P 202 703
(M14 x 1.5)

Usable Cu seal ring: 2 916 710 607

Note:

As of FD 552 the distance between the sealing surface and the inner plastic closure cap on the above-quoted fuel filters has been enlarged. As of this FD (date of manufacture) it is no longer necessary to replace the inlet-union screw.

Warranty: None

Goodwill: None

Published by:

ROBERT BOSCH GMBH

Division KH

Technical After-Sales Service (KH/VKD 2)

Please direct questions and comments concerning the contents to our authorized representative in your country.

Service Information

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Kenntnis genommen

Bearbeiter

Inhaber

Meister

Mechaniker

An VH, AV/S, BG, BD, BV

VDT-I-AUT 002 B

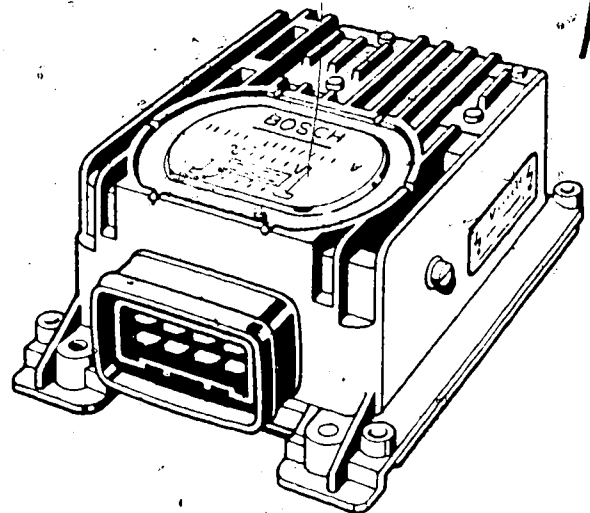
January 1973

AUDI 100

Battery Capacitor-Discharge
Ignition System (BCDI) with Single-Pulse Charging

Trigger Box 0 227 200 005

Ignition Transformer 0 221 121 005



1. Test equipment

Test panel	EFAW 81	0 681 103 400
Transformer	EFAW 82	0 681 103 402
Voltmeter, for example the Mini-Tester	EFAW 226	0 681 102 800
Ignition coil and capacitor tester or	EFAW 106 A	0 681 100 001
Spark gap	EF 1177/7	1 684 531 000
Ammeter, for example	Multavi I	available commercially
Ohmmeter, for example	Pontavi	available commercially

2. Danger of accident when working on capacitor-discharge ignition systems

During recent years, modern semiconductor ignition systems with constantly increasing levels of discharge energy and higher ignition voltages have been developed to supplement the original coil ignition systems. Working on these modern systems has become correspondingly more dangerous.

- With the battery-powered capacitor-discharge ignition system (BCDI), if terminals or cables connected to the ignition transformer are touched, currents strong enough to be lethal can be drawn in the following cases
- When the trigger box is operated without the ignition transformer, either in the vehicle or on the distributor test stand, when work is performed on a trigger box, removed from the vehicle, which had been in use a relatively short time before.

3. Instructions for working on the capacitor-discharge ignition system in the vehicle

3.1.

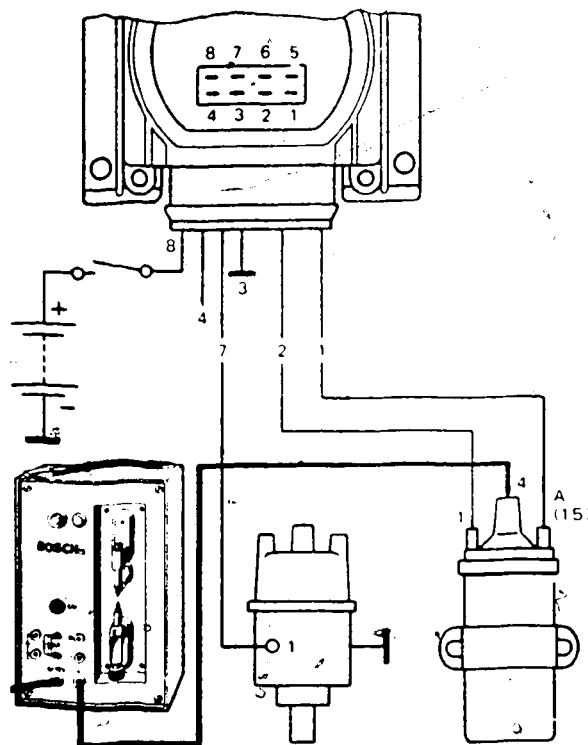
In no case may equipment such as interference suppression capacitor, stroboscopic timing light, test light, etc. be connected to terminal A of the ignition transformer because voltages up to 450 V can be present at this point. The ignition transformer must not be replaced by a standard ignition coil nor connected or tested as one.

Engines which are running must not be switched off by means of a jumper wire or with a tool connected between terminal A (of the ignition transformer) and ground. Such action inevitably results in the destruction of electronic components. In addition, when the trigger box has been switched off (ignition off), the cable leading to the transformer (terminal A) must not come into contact with vehicle ground. The trigger box can even be destroyed if its terminals are grounded by hand contact.

Trigger box connections

- Terminal 1 = Ignition transformer, terminal A or 15
- Terminal 2 = Ignition transformer, terminal 1
- Terminal 3 = Ground
- Terminal 4 = to tachometer
- Terminal 5 = not used
- Terminal 6 = not used
- Terminal 7 = Contact breaker, terminal 1
- Terminal 8 = Ignition lock, terminal 15

Fig. 1



3.2.

The ignition must be turned off and the multi-contact plug must be removed from the trigger box when work, such as the connection and disconnection of cables, is carried out on the BCDI.

3.3.

When charging the batteries they must be disconnected from the rest of the vehicle electrical system or the ignition must not be switched on. Fast chargers must not be used as a starting aid. When installing batteries ensure correct polarity (minus pole to ground).

3.4.

The BCDI must not be operated without the battery.

3.5.

The trigger box must not be operated without the ignition transformer.

If this point is disregarded the trigger box will be destroyed!

3.6.

If the BCDI is tested without a spark gap, there is danger of arcing in the ignition transformer (damage to insulation).

3.7.

A 2.2 μ F capacitor is installed in the trigger box for radio interference suppression.

4. Checking the ignition system in the vehicle

Connect the dwell-tach tester according to the appropriate Operating Instructions.

Adjustment data for dwell angle and ignition point are to be taken from Adjustment Data Sheets VDT-T-AUT...

5. Checking the trigger box

5.1. Measuring the spark gap

Connect spark gap unit EFAW 106 A to the ignition transformer and set spark gap to 10 mm. Connect the black clip (-) to vehicle ground. Do not connect the red clip (+). Join the high voltage cable from the tester to terminal 4 (of ignition transformer) as shown in Fig. 1. When the starting motor is operated, a steady sequence of sparks must be seen on the spark gap unit. If this is not the case, carry out the tests described below through Section 5.6. If no defect can be located and sparks are still not present, the trigger box must be replaced.

5.2. Checking connections

Check the wiring harness and all connections for good contacts (loose, corroded).

5.3. Voltage measurement

Remove the multi-contact plug from the trigger box and check with a voltmeter whether the battery voltage is present at plug terminal 8 when the ignition is switched on (Fig. 2).

5.4. Measuring contact breaker current

Replace the multi-contact plug in the trigger box. Connect the ammeter (0.3 A scale) in series with the cable leading to terminal 1 of the distributor (Fig. 3). The current should be between 0.11 A and 0.13 A with 11-13 volts battery voltage.

Important Note:

The contact points must be closed during this measurement. (Remove the distributor cap if necessary to be sure of this.) If the current value deviates from the above values, connect an auxiliary ground cable to terminal 1 of the distributor. If the specified current readings are now obtained the contact points are dirty or open circuit.

5.5. Checking the ignition transformer (connector cables disconnected)

Important Note:

The ignition transformer can only be checked with an ohmmeter. EFMZ 1 A and other test devices used for testing normal (standard) ignition coils can not be used here.

Resistance of primary winding,
measured between terminal 1 and terminal A (15)
0.1 - 0.165 Ω

Resistance of secondary winding,
measured between terminal 4 and terminal 1
390 - 630 Ω

Fig. 4

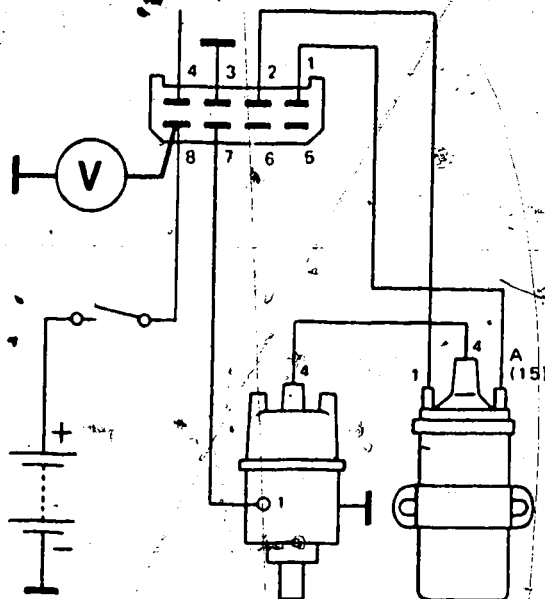
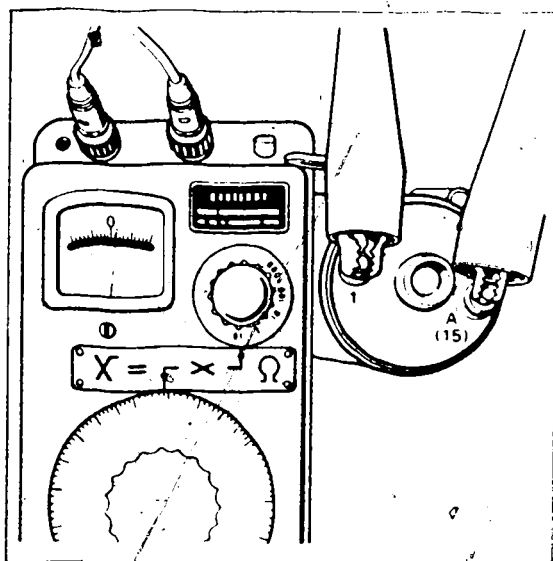
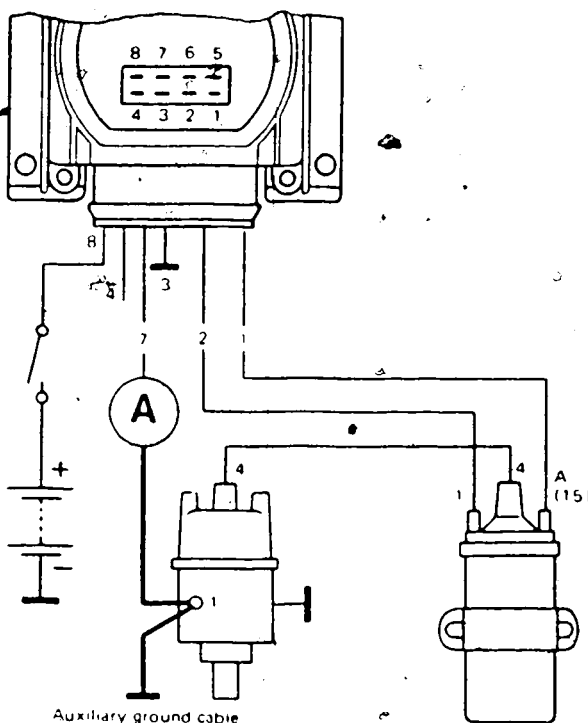


Fig. 2

Trigger box connections

- Terminal 1 = Ignition transformer, terminal A or 15
- Terminal 2 = Ignition transformer, terminal 1
- Terminal 3 = Ground
- Terminal 4 = to tachometer
- Terminal 5 = not used
- Terminal 6 = not used
- Terminal 7 = Contact breaker, terminal 1
- Terminal 8 = Ignition lock, terminal 15

Fig. 3



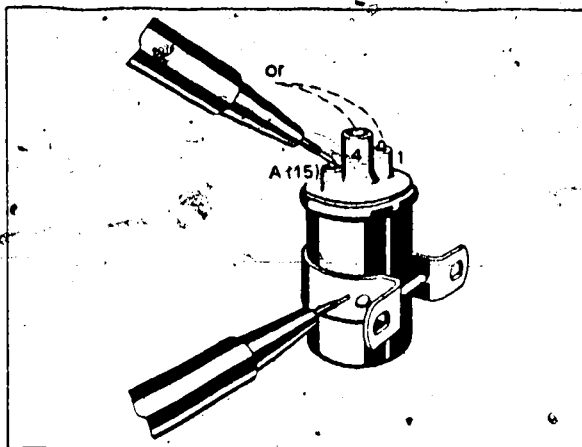
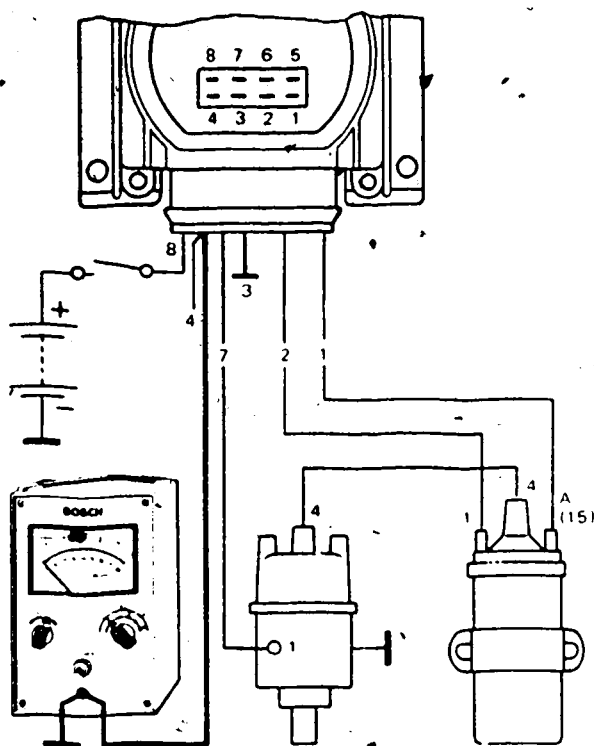


Fig. 5

Fig. 6



Checking for short circuit to ground

Remove the ignition transformer from the vehicle. Set the selector switch on Test Panel ÉFAW 81 to the „220 V =“ position. Touch the first test prod to ground and touch the second test prod to terminals 1, 4, and A (15) one after the other. If the indicator lamp lights up, the ignition transformer has a short circuit to ground.

5.6. Checking the electronic tachometer circuit

Connector No. 4 on the trigger box is intended for the connection of an electronic tachometer.

Connect, according to the appropriate Operating Instructions, one test prod from the engine speed measuring instrument to terminal 4 of the trigger box (cable color code black/yellow). If the meter does not show a reading, replace the trigger box.

Trigger box connections

- Terminal 1 = Ignition transformer, terminal A or 15
- Terminal 2 = Ignition transformer, terminal 1
- Terminal 3 = Ground
- Terminal 4 = to tachometer
- Terminal 5 = not used
- Terminal 6 = not used
- Terminal 7 = Contact breaker, terminal 1
- Terminal 8 = Ignition lock, terminal 15

ROBERT BOSCH GMBH
Geschäftsbereich K Ausrüstung
Handel
Kundendienstschule

BMW PASSENGER CARS WITH L-JETRONIC

VDT-I-BMW 027 En

7.1980

Fuel-pump noise

Just lately, in the case of a number of different BMW passenger cars fitted with L-Jetronic, noises have occurred which are very similar to those originating from fuel-supply pumps. This noise though, stems from hydraulic vibrations in the fuel lines when the injection valves inject.

Remedy:

1. Check the routing of the fuel lines from the fuel tank to the engine compartment. They must have no direct contact with the bodywork.
2. Fit a diaphragm damper 0 280 161 006 in the fuel-return line on the fuel-tank side of the pressure regulator. Attach to the bulkhead. If necessary, lengthen the fuel line.

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BMW 635 CSI, 735 CSI,
633 CSI, 733 i

VDT-I-BMW 032 En
10.1980

Motronic control unit
with PC-board switch

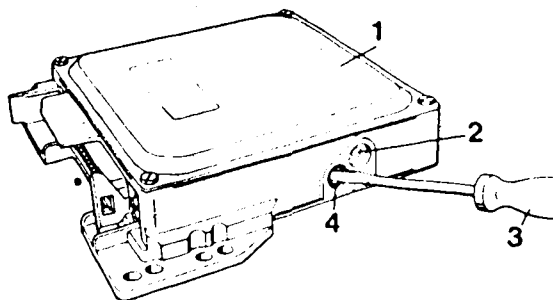
As from August 1980, the control units 0 261 200 002 for the 635 CSI and 735 i, the 0 261 200 004 for Sweden and Australia and later-models a PC-board switch which is accessible from outside the unit (Fig. 1).

The introduction of this switch means that workshop personnel have the possibility of changing the ignition point and are also provided with an additional mixture adaptation facility. The values for mixture and ignition correction/adaptation are held within relatively tight limits. They were selected in order that with this PC-board switch in any position, damage cannot normally occur to the engine provided that the prescribed gasoline/petrol is used.

Unnecessary adjustment to the switch though, leads to poor driveability, and particularly to "search" during overrun and increased fuel consumption.

Fig. 1

- 1 = Control unit
- 2 = Diode
- 3 = Screwdriver
- 4 = PC-board switch cap



Ignition-point correction

The quality of the gasoline on sale in a variety of countries does not always comply with the standard required for this engine. It is therefore recommended that for journeys in countries where the premium gasoline (super-grade petrol) octane number (research method) is below 98 a correction is carried out to the ignition point by means of the PC-board switch. At the moment, this applies to the following countries:

Bulgaria, Czechoslovakia, DDR, Greece, Hungary, Poland, Rumania, Spain and Turkey.

The correction of the ignition point by 4.5° crankshaft in the "retard" direction applies across the whole of the ignition-point map and prevents the "ping" and "knock" which are dangerous for the engine.

The adjustment of the ignition point leads, inevitably, to an increase in fuel consumption.

For this reason, as soon as the journey has been completed for which such an adjustment was carried out, the original setting must be adjusted again.

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Mixture adjustment

As is already known, the CO-adjustment takes place through the idle-mixture screw in the air-flow sensor. This is still the case and no change has taken place here. The PC-board switch though, apart from changing the ignition point also provides an additional possibility of adjusting the mixture. The PC-board switch is operative over the complete range as opposed to the bypass in the air-flow sensor which is only effective at idle and lower part-load range. For this reason, a change in the mixture using this switch is only justified when it is absolutely certain that defects are not present on the engine (i.e. valves, intake system, exhaust), the fuel-injection system or the ignition.

The Motronic is checked using the after-sales service instructions which have already been issued.

Further details can be taken from the Table on the last page of this Service Information.

Special adjustment pin-KDMT 0001 for the PC-board switch (Fig.2)

Bosch has developed a special tool to facilitate the professional adjustment of the PC-board switch. The tool is of plastic material and, in order to prevent damage to the valuable control unit when the switch is forced up against the stop, the triangular end breaks off when too much force is used.

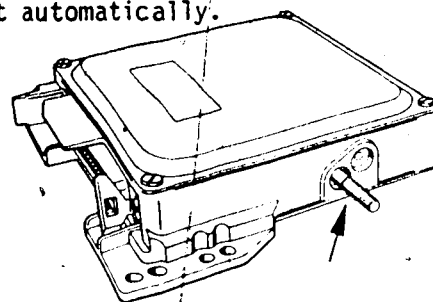
NEVER use a screwdriver to adjust the PC-board switch.

The special tool KDMT 0001 is available through the usual channels or directly from KH/VKD 4.

Subscribers to the tool program receive it automatically.

Fig. 2

Adjustment pin KDMT 0001
fitted in control unit (arrow)



Adjusting the PC-board switch

Remove the control unit (see After-sales service instructions)

Using a screwdriver, carefully remove the cap (Fig. 1)

In order to do this, insert a wide-bladed screwdriver into the cap at an angle (Fig. 1). Carefully push through the cap and remove it. Take care that the PC-board is not knocked or otherwise contacted in the process.

The hole (triangular polygon) is now free for insertion of the special tool KDMT 0001.

Due to the danger of destroying or damaging the control unit metallic objects or screwdrivers are NOT to be used

Using a minimum of force, turn the PC-board switch to its left-hand stop (Fig. 3). If already adjusted, count the number of "click" positions and note them down.

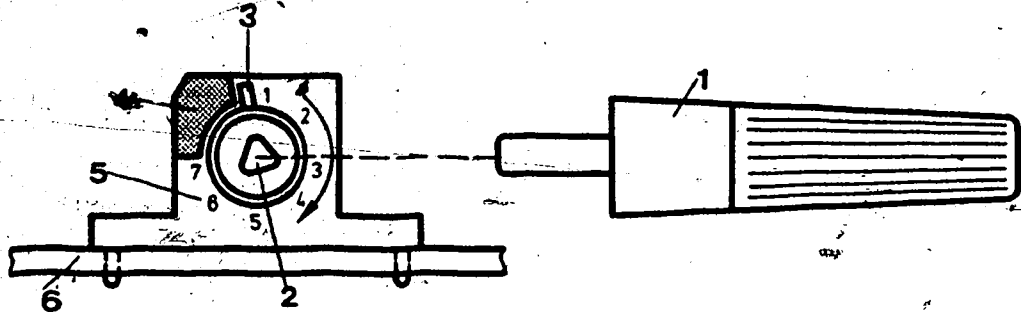
Select the new switch position according to the following Table.

Count the number of "click" positions starting from the left-hand stop.

Take into account the fact that the switch has defined detent positions and intermediate positions are not possible.

Check that the setting is correct by using the CO-analyzer and taking the vehicle on a test run.

Fig. 3



After the adjustment has been completed, a new cap (red) MUST be fitted in the hole in the control unit. This is important because it guarantees protection against humidity and prevents unauthorized tampering.

Part number for red cap : 1 280 508 012

Note: Black and blue caps are only fitted by either Bosch or BMW at the works.

Fig. 3

- 1 = Adjustment pin KDMT 0001
- 2 = Bore (triangular polygon)
- 3 = Basic setting (left-hand stop)
- 4 = End stop
- 5 = Switch positions ("click" or detent positions)
- 6 = PC board

PC-board switch positions and their range of application.

Switch pos'n	Range of adjustment for mixture (CO)	Ignition-point correction	Range of application
Left-hand stop	Basic setting = works setting		Driveability OK CO - OK or corrected by means of the idle-mixture screw in the air-flow sensor
Pos'n 1	Richer by +4% (injection duration is increased by 4%, based upon 1% CO, the CO figure climbs to approx. 2 to 2.5%)	0 (unchanged)	Cause of complaint: Shake or "search", CO cannot be sufficiently adjusted using idle mixture screw in a-f sensor. First check: valve setting, idle contact, unmetered air. Increased fuel consumption can occur upon adjustment.
Pos'n 2	Leaner by -4% (injection duration is decreased by 4%)	0	Cause of complaint: Excessive fuel consumption, mixture too rich, mixture adjustment not possible with idle-mixture screw in a-f sensor. Try setting idle CO using idle-mixture screw again after setting switch to 2 or 3. If shaking or "search" occur, setting is unsuitable.
Pos'n 3	Leaner by -6% (duration of injection reduced by 6%)	0	
Pos'n 4	0 (as basic setting)	-4.50 crankshaft (in retard direction)	For countries in which the octane number (research method) is below 98. Increased fuel consumption can occur upon adjustment.
Pos'n 5	Richer by +4% (as switch position 1)	-4.50 crankshaft (in retard direction)	For countries in which the octane number (research method) is below 98, and when a PC-board switch correction has already been carried out to pos'n 1, 2 or 3. Example: If a vehicle comes into the workshop and is to be adjusted to lower quality fuel, then switch pos'n 6 is to be selected.
Pos'n 6	Leaner by -4% (as switch position 2)	-4.50 crankshaft (in retard direction)	
Pos'n 7	Leaner by -6% (as switch position 3)	-4.50 crankshaft (in retard direction)	Also to be noted when turning back the switch: Increased fuel consumption can be the result.

BMW INDUSTRIAL AND MARINE ENGINES

VDT-I-BMW 033 En

with VE.. F.. distributor-type
fuel-injection pumps

11.1980

The BMW industrial and marine engine in question is a VM-engine of the type HR 692 HT. It is water-cooled and equipped with a VE.. F.. distributor pump, an electromagnetic shutoff device, a manifold-pressure compensator (LDA), a variable speed governor and a cold-start accelerator (KSB) at the timing device.

Engine data

Engine swept volume	Power output	Rated speed	Firing sequence	Compression
3590 cm ³	105 kW (143 DIN HP)	4200 min ⁻¹	1-5-3-6-2-4	22:1

Fuel-injection equipment

Distributor pump	: 0 460 416 014 - VE 6/11 F 2100 L 63
Single-stage box-type filter	: 0 450 133 013
Fuel-filter box	: 1 457 434 106
Sheathed-element glow plug	: 0 250 200 453
Series resistor	: 0 251 103 038
Nozzle-and-holder assembly comprising:	: 0 432 297 041
Nozzle-holder assembly	: 0 431 212 995 - KBE 58 S 4/4
Nozzle	: 0 434 250 011 - DN 0 SD 1510
Nozzle opening pressure	: 135 bar overpressure

Technical documentation

The necessary technical documentation has already been published.

Service parts lists are on microfiche.

Test specifications, until they are issued on microfiche, can be obtained from KH/VSK 1 through your local representative.

Tools

For repair : refer to Catalog Sheet KD-EP 11 D

For testing: Timing-device-travel measuring device 1 688 130 139

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Timing the pump to the engine

The pump is timed to the engine using the dial-indicator method.

Timing point

Pump : At a plunger lift of 0.5 mm after BDC
Engine: 4° BTDC

Work units (WA)

Work units for repair and testing of the VE.. distributor pump have not yet been issued.

Provisional work units

Complete disassembly	max. 45 AW
Checking, adjusting and repair of a minor fault (for instance, a leak)	max. 16 AW

Notes on After-Sales Service

After-sales service is to be carried out on these VE.. F.. distributor pumps in the normal manner.

Please get into touch with the BMW representative in your area and ascertain the sales figures for these engines.
Every possible effort is to be made to ensure that your workshop carries out impeccable and speedy repair work on the fuel-injection system of these engines.

BMW 745i TURBO

VDT-1-BMW 036 En

Failure of L-Jetronic control unit

3.1981

(Replaces Ed. 2.1981)

If the three-pin plug of the trip computer is plugged in wrongly (wrong polarity), the final stage of the L-Jetronic control unit will be damaged when starting.

Result: the engine does not run or runs very unevenly..

In such cases no claims for guarantee will be accepted.

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BMW

VDT-I-BMW 039 En

525i, 528i, 628CSi, 725i, 728i

8.1981

L-Jetronic 2nd. generation

Vehicles manufactured as from 9.81

With the above mentioned types of vehicle BMW are introducing the L-Jetronic of the 2nd. generation.

The difference from the existing L-Jetronic systems is not the method of operation of the injection system, but the design of the control unit and of the injection valves.

Control unit (0 280 001 3..)

- new electronic construction
- new plug and socket, 25 pin
- new housing

Injection valves (0 280 150 2..)

- brass-wire coil with higher resistance
- O-ring connection design

Testing possibility L-Jetronic II

From February 1982 a Universal tester will be available to the After-Sales Service Organization. The L-Jetronic II and other new injection systems can be tested with this tester.

Urgent cases for the After-Sales Service

If problems should arise on vehicles with L-Jetronic II during the period prior to the availability of the Universal tester, please contact KH/VKD 2.

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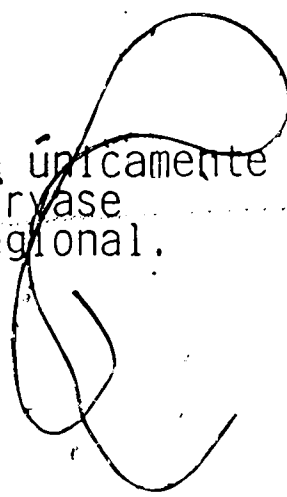
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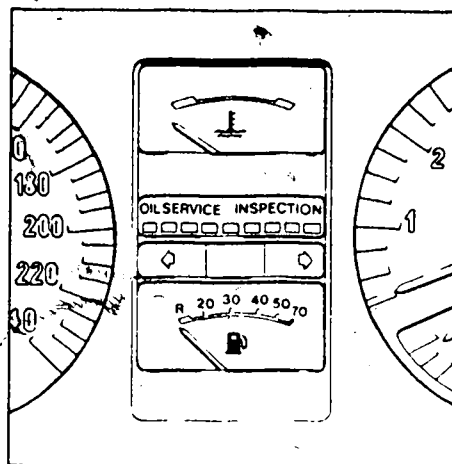
BMW 518, 520i, 528i, 528i, as of 6.81 with service inspection indicator (SI).

VDT-I-BMW 042 En

5.1982

All BMW vehicles of the new 5 series are equipped with a service inspection indicator (SI).

It is located in the instrument cluster between the tachometer and the speedometer.



The new service inspection indicator is intended to make the owner take his vehicle into the BMW workshop for a service as required by the respective driving and operating conditions of the vehicle. Such a service is, therefore, no longer bound to fixed intervals or fixed mileages, but predominantly to the operating conditions of the vehicle.

Depending on the operating conditions, a computer records and evaluates the

- engine speed
- engine temperature
- miles driven and the time.

The lighting up of yellow and red indicator lamps indicates that an oil service and an inspection, respectively, are due. After the oil service or the inspection, the indicator lamps of the service inspection indicator are cancelled with an electronic resetting device.

This resetting device can be ordered from any BMW dealer.

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The service inspection indicator is not connected with the operation of the vehicle electrical system. Therefore, this does not affect the entire range of Bosch services as regards the testing and repair of vehicle electrics and mixture preparation or other specific repair operations.

If a vehicle owner asks for the service inspection indicator to be reset, we recommend the following procedure:

Point out to the customer that this indicator indicates the need for an oil service or an inspection. An inspection includes, for example, the checking of safety components such as brakes and steering. The vehicle-related inspections are not normally carried out by Bosch after-sales-service workshops. You should in such cases refer the customer to an authorized BMW dealer.

The inspection operations are listed in detail in the Appendix.

If the customer asks for a limited inspection (e.g. tune-up, ignition test etc.) while at the same time asking for the service inspection indicator to be reset, then the invoice must be provided with a stamp (as per specimen below) and the customer's signature.

Limited inspection

Signature

Customer:

The service inspection indicator is reset by plugging the resetting device into the diagnostic socket. The oil service/inspection indicators are cancelled separately by means of two push-buttons.

Resetting after oil service:

Switch on ignition - do not start engine. Press yellow push-button and keep pressed. Function lamp "green" comes on.

After about 10 seconds the yellow indicator lamp lights up and goes out again after about 3 seconds. The system is reset, release the yellow push-button.

Remove the service inspection indicator resetting device from the diagnostic socket.

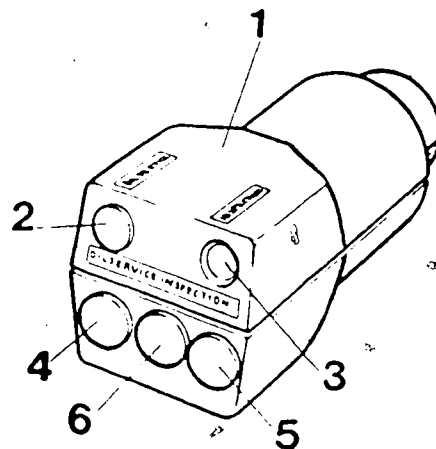
Resetting after inspections I and II:

Switch on ignition - do not start engine. Press the recessed red push-button and keep pressed. Function lamp "green" comes on.

After about 3 seconds the red indicator lamp lights up and goes out again after about 12 seconds. The system is reset, release the red push-button.

Remove the service inspection indicator resetting device from the diagnostic socket.

- 1 = Service inspection resetting device
- 2 = "Yellow" oil service resetting button
- 3 = "Red" inspection resetting button
- 4 = "Yellow" oil service indicator lamp
- 5 = "Red" inspection indicator lamp
- 6 = "Green" function lamp



Appendix: BMW Oil Service and Inspection Operations

Engine Oil Service

(with option of BMW Safety Test)

Change engine oil and renew oil filter element while at normal operating temperature.

Check brakes:

Brake pads (remove and install wheels), brake discs, pipes, hoses, connections, fluid level, hand brake cables, Hand-brake adjustment. Rear disc brakes: Bed down the hand brake linings.

Important: Brake fluid must be renewed at least once a year.

Check tyres and wheels:

Condition, tyre pressures, correct sizes.

Check lighting:

Headlights, additional driving lights (including beam settings), parking, rear and reversing (backup) lights, license plate, instrument and inscription lighting, telltale and warning lights.

Check warning systems:

Horn, turn indicators, hazard warning flashers, brake lights, headlight flasher, rear fog light(s).

Check windshield wipers and washers:

Wiper blades, washer system (for windshield and, where applicable, headlights), fluid reservoir (level), antifreeze protection, washer jet aiming (windshield and, where applicable, headlights).

Check seatbelts:

Condition and correct operation.

Exhaust emission test:

Engine must be at normal operating temperature.

Safety TestCheck steering:

Steering box, steering linkage, joint disc, threaded connections, freedom from leaks, oil content, V-belt tension and condition on cars with power steering.

Inspection I

- ☐ Renew the spark plugs.
- ☐ Change the engine oil and renew the oil filter element at normal operating temperature.
- ☐ Check gearbox oil level and top up if necessary.
- ☐ Check final drive (rear axle) oil level and top up if necessary.
- ☐ Check power steering for leaks and restore correct oil level if necessary.
- ☐ Inspect coolant hoses for leaks; check coolant level and concentration and correct if necessary.

Important: Coolant must be drained completely and renewed every 2 years

- ☐ Check battery acid level and top up with distilled water if necessary.
- ☐ Check fluid level in reservoir for brake and clutch hydraulic systems, and top up if necessary.
- Important:** Brake fluid must be renewed at least once a year.
- ☐ Check tension and condition of all V-belts and correct tension if necessary. Renew if necessary (to be billed to customer as a separate item).
- ☐ Oil pivots and bearing points on carburetor linkage and rotary shaft if necessary or throttle butterfly actuating linkage, or grease the throttle butterfly lever pivot points and gate.
- ☐ Take up any slack at nuts on exhaust manifold.
- ☐ Inspect fuel lines, fuel tank and hoses for correct positioning, condition and freedom from leaks. Renew the main fuel filter (throwaway element).
- ☐ Check valve clearances and adjust if necessary.
- ☐ Intake air cleaner: renew filter element. Renew at more frequent intervals in very dusty conditions.
- ☐ Check for freedom from play at steering, and adjust as necessary. Check condition of track rod and front axle pivots. Check steering box, linkage and joint disc.

- ☐ Check condition, positioning, mounting and freedom from leakage on exhaust system.
- ☐ Remove and install front disc brake pads (and rear pads if car has rear disc brakes), check overall thickness and renew pads if necessary. Examine brake disc surfaces. On light alloy wheels, grease the positive wheel centering spigots.
- ☐ Check tyre pressures and correct if necessary. Check condition of tyres; if worn unevenly, measure and adjust wheel alignment (to be billed as a separate item).
- ☐ Check brake system connections and lines for leaks, damage and incorrect positioning. Clean linings and drums for foot brake on cars so fitted and examine for wear. Inspect wheel brake cylinders and dust sleeves for leaks. Check free movement of hand brake cables. Adjust hand brake.
- ☐ Take up any slack at door and lid catches and oil or grease them. Check correct operation.
- ☐ Self-leveling suspension: check oil level in tank with vehicle unladen, and correct if necessary.
- ☐ Check headlights and auxiliary driving lights.
- ☐ Check lighting equipment: parking, turn indicator, rear, brake and reversing (backup) lights, rear fog light(s), license plate, interior, glove box and luggage compartment lights.
- ☐ Check horn, headlight flasher and hazard warning flashers.
- ☐ Check instrument and inscription lighting.
- ☐ Check operation of ABS (antilock braking system) warning light.
- ☐ Check fluid level and antifreeze concentration in windshield washer reservoir, and correct if necessary.
- ☐ Check wipers and washer system: wiper blades, washer jet aiming.

- ☐ Check condition and operation of seat belts
- ☐ Sliding/vent roof: grease slide rails.
- ☐ Engine test in accordance with factory directives. Check dwell angle and re-time the ignition if necessary. Check engine idling and exhaust emission settings and adjust if necessary.
- ☐ Final check with road safety test (brakes, bedding down handbrake, linings if car has rear disc brakes, steering, clutch or automatic transmission, springs and shock absorbers (visual inspection); mirrors).
- ☐ Check operation of heater blower. Check operation of telltale and warning lights in instrument cluster and in Check-Control unit.

Inspection II

includes all items listed under Inspection I, and the following additional checks and maintenance operations:

- ☐ Change oil when at normal operating temperature in manual gearbox or automatic transmission, and in final drive (rear axle).
- ☐ Renew oil mesh strainer for automatic transmission
- ☐ Check clutch driving plate for wear.
- ☐ Front wheel bearings: check play and adjust if necessary.
- ☐ Rear disc brakes: check thickness of handbrake linings and renew if necessary.
- ☐ Half-shafts: check for leaks at flexible gaiters.

Please direct questions and comments concerning the contents to our authorized representative in your country.

BMW 518, 520i, 525i, 528i, as from 6.1981
with Service Inspection Indicator (SI)

VDT-I-BMW 042 En

Suppl. 1
11.1982

Enquiries concerning the service inspection indicator have shown us that a supplement to Service Information VDT-I-BMW 042 En of 5.1982 is necessary.

With the BMW service inspection indicator, the customer is shown the time when his vehicle is due for its next inspection. This inspection includes, amongst other things, work on the safety systems, e.g. the brakes and the steering.

If you reset the SI after specific repairs have been carried out, the customer could assume, according to the BMW after-sales service instructions, that all components in his vehicle are now in working order again.

You cannot on any account guarantee this.

You are therefore also involved in a safety risk. An attempt could be made to make you responsible for any damage which occurs to part of the safety system which you have not repaired.

We would request you, therefore, to proceed as follows:

Do not on any account reset the SI during the guarantee period, but always refer the customer to the relevant BMW contracted workshop. Such cases occur, however, very seldom, since guarantee claims on new vehicles are directed practically without exception to the contracted workshops of the relevant make of vehicle.

The indicator should not be reset after the guarantee period either. After typical Bosch service work, like repairs to the electrical system or to the fuel-injection system in the vehicle, it is not necessary to reset the SI.

You should recommend your customer to have the SI reset after the next inspection at a BMW contracted workshop, even after the guarantee period.

If a customer should insist on you resetting the SI, then please state clearly on the order and on the bill that you have not carried out any repair work on the safety components, e.g. brakes or steering.

In this way you will not be liable for any problems arising from these systems and the impression cannot be given that you have carried out a full inspection, including the safety components.

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BMW MOTORCYCLES WITH KICK STARTER

VDT-I-BMW 043 En

New TI trigger box

5.1983

0 227 100 ..

BMW motorcycles with kick starter (civil design) which have been fitted since September 1980 as standard with a transistor ignition system, have a new TI trigger box as from September 1982. The trigger box has been changed

from 0 227 100 113

to 0 227 100 116.

The new trigger box 0 227 100 116 is identical in dimensions and in its method of operation.

Exception: In motorcycles with radio-communication system and full interference-suppression belonging to authorities, trigger box 0 227 100 113 must still be used in cases of replacement.

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KNOCK CONTROL AND CHARGE-AIR PRESSURE CONTROL IN BMW 745i

VDT-I-BMW 044 En

10.1983

General

Since May 1983 BMW has been delivering the 745i type with Motronic, electronic transmission shift control as well as knock and charge-air pressure control.

The former 745i with L-Jetronic will therefore no longer be produced.

The Motronic in the 745i is the same as the system already known as regards the basic functions, but is different in that it operates together with the electronic transmission shift control in a common control unit. A description of the electronic transmission shift control is contained in Technical Bulletin VDT-I-261/... The operating method of the turbo charger is described in detail in Technical Bulletin VDT-I-280/3 En.

Basic concept

As a basis, the 3.4 l 6-cylinder engine has been used instead of the 3.2 l assembly. In addition, the turbo engine has also been fitted with a knock and charge-air pressure control in order to influence the charge-air pressure and ignition angle. Both control measures are effected by the knock-control unit.

The purpose of this control is to adjust the charge-air pressure as a factor of engine speed and throttle-valve angle (corresponding to the load range the driver desires) to a value prescribed in the ignition map. When the engine is knocking, the ignition point is retarded and the charge-air pressure is reduced. With the aid of an optimally designed charge-air pressure control, a favorable degree of engine efficiency is achieved and the knock control makes possible an increase in output in the full-load range. Moreover, the engine can be operated with fuel with a lower octane rating: this of course leads to a reduction in output.

The above mentioned measures protect the engine at the same time from damage caused by knocking and reduce fuel consumption in the middle and upper-load ranges.

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Turbo-charging with charge-air pressure control

With the former principle of charge-air pressure control there was an excess build-up of charge-air pressure in the middle and upper load ranges. The disadvantage of this was that the knock limit was reached sooner and there was a loss of output due to so-called engine pumping loss.

With this optimum control of ignition angle and charge-air pressure, these disadvantages can be eliminated because:

- + the air temperature drops and as a consequence,
- + the tendency to knock is reduced and by
- + reducing the exhaust-gas back pressure in front of the turbine,
- + the pumping loss is reduced.

The air sucked in passes through the air filter and the air-flow sensor and reaches the compressor of the exhaust-gas turbocharger. The compressed and warmed air is cooled again in the charge-air cooler in order to improve the cylinder filling. The position of the throttle valve now determines the desired air quantity.

The exhaust gas passes through the exhaust manifold and into the exhaust turbine which, on account of the pressure and kinetic energy of the exhaust gas, is used as a drive for the compressor.

The charge-air pressure is set on the input side of the compressor, as before, by a charge-air pressure valve. A new feature, however, is that the valve is not controlled directly by the charge-air pressure, but is influenced by a solenoid-operated valve. Depending on the engine load and the occurrence of knocking, the time-pulsed solenoid valve opens either to a large extent or not very much at all and accordingly the charge-air pressure valve is subjected to a modified control pressure. The more the solenoid valve opens, the greater the effective pressure and thereby the greater the exhaust-gas quantity passed through the turbine. The charge-air pressure decreases.

With the aid of a potentiometer on the throttle valve, the knock-control unit recognizes the actual position (angle) of the throttle valve and receives direct information about the engine load desired by the driver. The microcomputer evaluates the signal from the charge-air pressure sensor in the knock-control unit and sets the nominal value prescribed in the charge-air pressure map.

Knock control

The knock control takes into account the longer running time of the charge-air pressure control. As a speedy measure, the ignition angle is retarded as soon as knocking is recognized. If the retarding of the ignition angle exceeds a programmed limit, the charge-air pressure is also reduced.

Light or individual cases of knocking can be eliminated just by ignition angle adjustment, without effecting the engine moment to any extent. If there is heavy and continuous knocking, then charge-air pressure control also begins to operate. This knocking is caused by e.g. low octane fuel or very high intake temperature.

Furthermore, the knock control permits an increase in the compression ratio and improves the thermo-dynamic efficiency.

Method of operation of knock control

Combustion knocks are registered with 2 knock sensors in a suitable position on the mixture-inlet side of the crankcase. The knock sensor consists of a piezoelectric element which converts the engine vibrations into an electric signal.

Since the knock sensor registers not only the genuine knock signals, but also the other engine noises, caused e.g. by valves closing, the knock-control unit must suitably select and filter the signals offered.

The knock sensors are each allocated to three cylinders. An inductive pulse generator "cylinder recognition", registers which cylinder is being ignited at that particular moment. It is pushed onto the ignition cable to cylinder 1 and consists of a single-aperture core with a winding.

Using the multiplex procedure, the knock-control unit always switches in the knock sensor, in the cylinder group of which a combustion process is taking place. In this way the degree of noise from the other cylinder group can be kept at a low level and the knocking sound can be registered with certainty by the evaluation circuit.

Ignition angle adjustment

With every combustion knock, the knock-control unit retards by a definite step the ignition point prescribed by the Motronic control unit. The adjustment is maintained until after a certain number of knock-free working strokes, when the ignition point is advanced in stages. This continues to happen until the ignition point prescribed by the Motronic is reached again.

The maximum retarded adjustment must be limited, so as not to let the exhaust-gas temperatures rise inadmissibly. If adjustment of the ignition angle alone is not sufficient to defeat the knocking, then the charge-air pressure control is switched in.

To guarantee a reliable start, the knock control is always tuned out when the vehicle is started. The ignition point determined by the Motronic control unit remains unchanged.

Safety functions (self diagnosis)

Essential components and functions of the knock control are monitored continually by the knock-control unit. These are: battery voltage, throttle-valve potentiometer, charge-air pressure, knock sensors and the evaluation circuit in the knock-control unit.

If the safety program recognizes a fault, the knock control and charge-air pressure control are rendered inoperative. To avoid damage to the engine, the knock-control unit retards the ignition angle by a fixed amount and the solenoid valve no longer receives any impulses. The solenoid valve, now not fed by current, opens fully and the charge-air pressure operates with full effect on the charge-air pressure valve in the exhaust-gas manifold. As a result the charge-air pressure valve opens earlier and lowers even further the charge-air pressure.

The effects on driving behaviour are unsatisfactory acceleration and a lack of output.

The response time of the monitoring circuit is dependent not only on the engine speed, but also on the importance of the cause of the fault. This means that the monitoring circuit does not respond immediately in every case.

Monitoring the battery voltage

If the battery voltage sinks below 9 V with the engine running (except when starting) the safety program is activated. If the battery voltage rises again over 10 V, then the knock control and charge-air pressure control become operative again.

Monitoring the knock sensor

If one or both knock sensors fail (e.g. open circuit), the monitoring circuit will respond continuously above an engine speed of 3000 min⁻¹.

Resetting, i.e. deleting the error stored in the memory, is only possible when the ignition has been switched off. When the ignition is switched on, the knock and charge-air pressure control runs according to program until the fault occurs again and the safety program is switched on.

Monitoring the throttle-valve potentiometer

If the slider voltage of the potentiometer does not lie within the limits demanded (e.g. because of a lack of supply voltage), then the monitoring circuit responds continuously until it is reset by switching of the ignition.

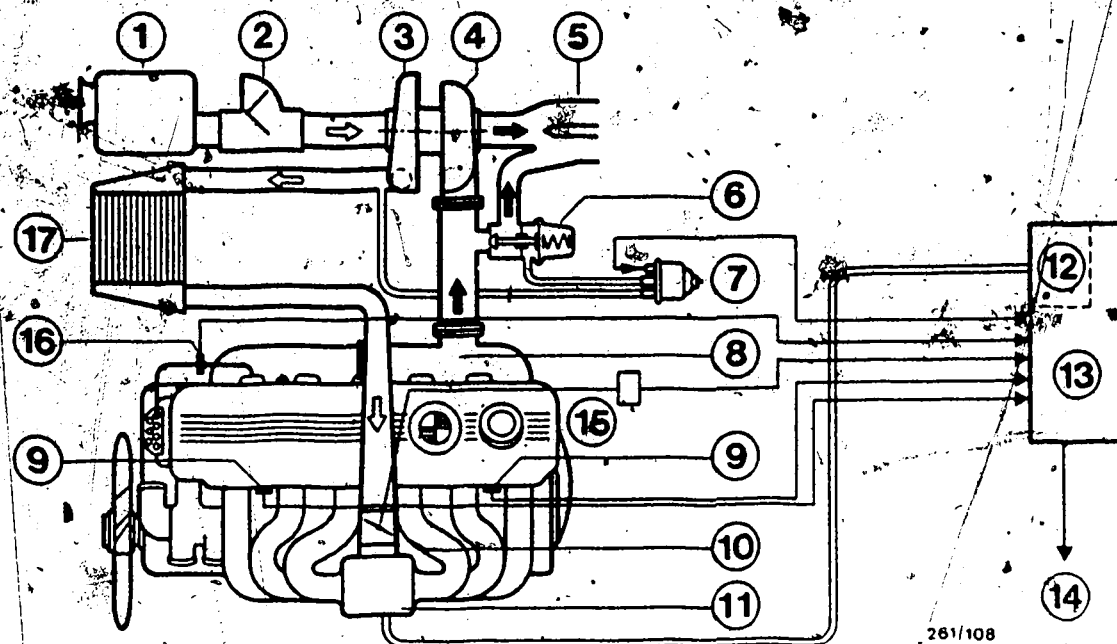
Monitoring the charge-air pressure

If the knock-control unit receives no information on the charge-air pressure (i.e. because the hose to the intake manifold has become disconnected), and if the full-load function is switched at the same time, the monitoring circuit responds continuously after a programmed response time. Resetting is carried out by switching off the ignition. The Motronic contains an additional overload protection device. In this way the injection impulses are cut off.

Monitoring the evaluation circuit

Monitoring is carried out in such a manner that at an engine speed below 2000 min⁻¹ test impulses are sent out from the knock-control unit at certain intervals. The evaluation circuit must recognize the test impulses, but without directing a retardation of the ignition angle. If several impulses in a sequence are not recognized, the monitoring circuit responds continuously. Resetting is again carried out by switching off the ignition.

Circuit diagram showing the operating principle of knock control and charge-air pressure control

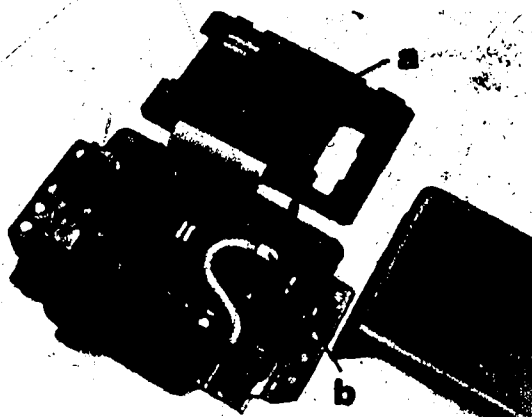


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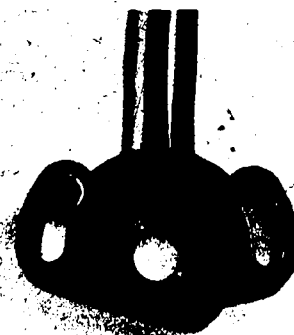
- 1 = Air filter
- 2 = Air-flow sensor
- 3 = Compressor
- 4 = Exhaust-gas turbine
- 5 = Front exhaust pipe
- 6 = Charge-air pressure valve (by-pass valve)
- 7 = Solenoid-operated valve
- 8 = Exhaust manifold
- 9 = Knock sensors

- 10 = Throttle valve
- 11 = Intake manifold
- 12 = Pressure sensor in knock-control unit
- 13 = Knock-control unit
- 14 = To/from Motronic/transmission control unit
 - Input: ignition-angle input
 - reference-mark signal
 - engine-speed signal
 - Output: ignition-angle output
 - full-load signal
 - knock-control signal
- 15 = Throttle-valve potentiometer
- 16 = Pulse generator for cylinder recognition
- 17 = Charge-air cooler

Components of the knock and charge-air pressure control



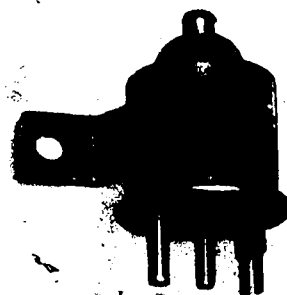
Knock-control unit opened
a = microprocessor
b = charge-air pressure sensor



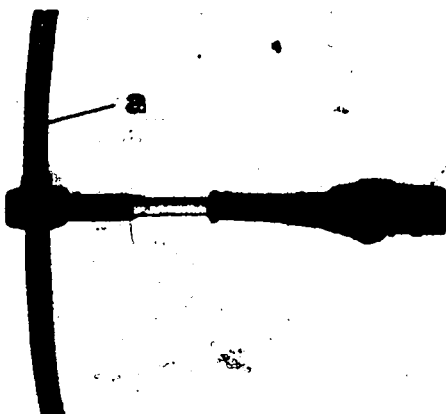
Throttle-valve potentiometer



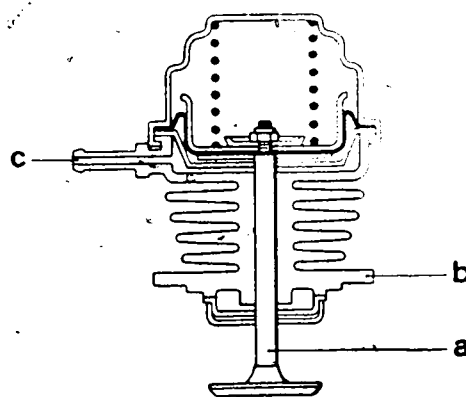
Knock sensor



Solenoid-operated valve

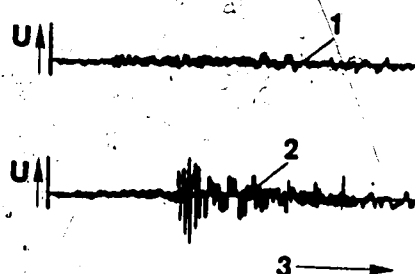


Inductive generator for
cylinder recognition
a = ignition cable

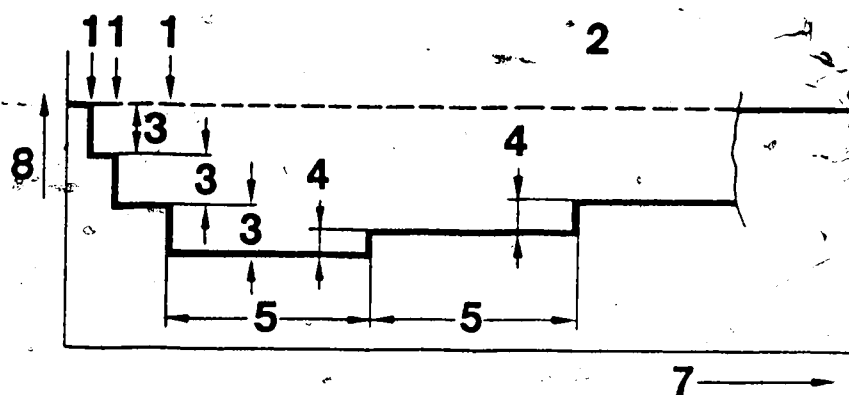


Charge-air pressure valve
a = valve
b = housing
c = control-line connection

Oscillogram and diagram of the knock and charge-air pressure control

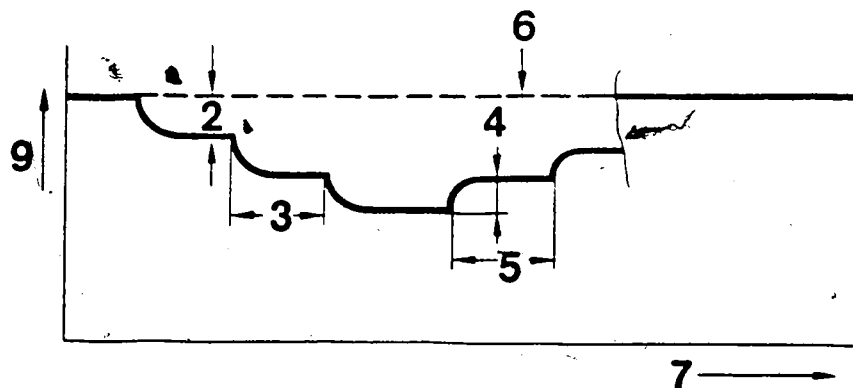


- 1 = Oscillogram for knock-sensor signal without knocking
- 2 = Oscillogram for knock-sensor signal with knocking
- 3 = Time



Several combustion knocks

- 1 = Occurrence of knocking
- 2 = Nominal value prescribed by the Motronic control unit
- 3 = Retarded ignition-angle adjustment per occurrence of knocking
- 4 = Advanced ignition-angle adjustment per step
- 5 = Advanced delay
- 7 = Working strokes
- 8 = Ignition angle



Charge-air pressure control in operation with knocking

- 2 = Depth of drop
- 3 = Length of block
- 4 = Height of rise
- 5 = Length of rise
- 6 = Charge-air-pressure nominal value from map
- 7 = Working strokes
- 9 = Charge-air pressure

Electrical equipment

BMW H.T. IGNITION CABLES

VDT-I-BMW 045 En

Repair with crimping tool

8.1985

1. General

As of 1.1984 BMW is using H.T. ignition cable sets with new latching connections on 4- and 6- cylinder engines.

Crimped onto the ends of the H.T. ignition cables are connecting parts which permanently latch on the spark-plug connectors and suppressors (ignition distributor/ignition coil).

In case of repair, therefore, it is possible either simply to install a complete H.T. ignition cable set or, by using the crimping tool, to replace individual H.T. ignition cables, spark-plug connectors or suppressors at low cost.

The following parts are required for repair:

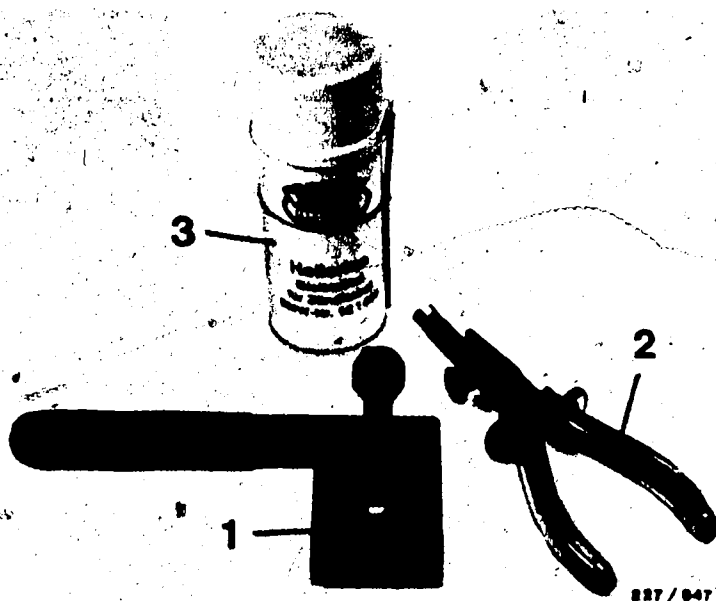
Connecting piece	1 350 390 086
Spark-plug connector	1 354 489 200
Suppressor	
(Ignition coil/distributor)	1 354 503 303
Suppressor	
(Ignition coil/high-voltage distributor) on Motronic	BMW service part
H.T. ignition cable, silicon (5 m pack)	7 781 700 016

Motor Vehicle Service Information



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- 1 = Crimping device
- 2 = Mounting pliers
- 3 = Lubricant

2. Crimping tool

The complete crimping tool (crimping device, mounting pliers, lubricant) can be obtained from

CARTOOL at a price of DM 221.10
(excluding VAT) by quoting Part No. 121 090.

This price is valid until February 1986.

	Motor vehicle service information	
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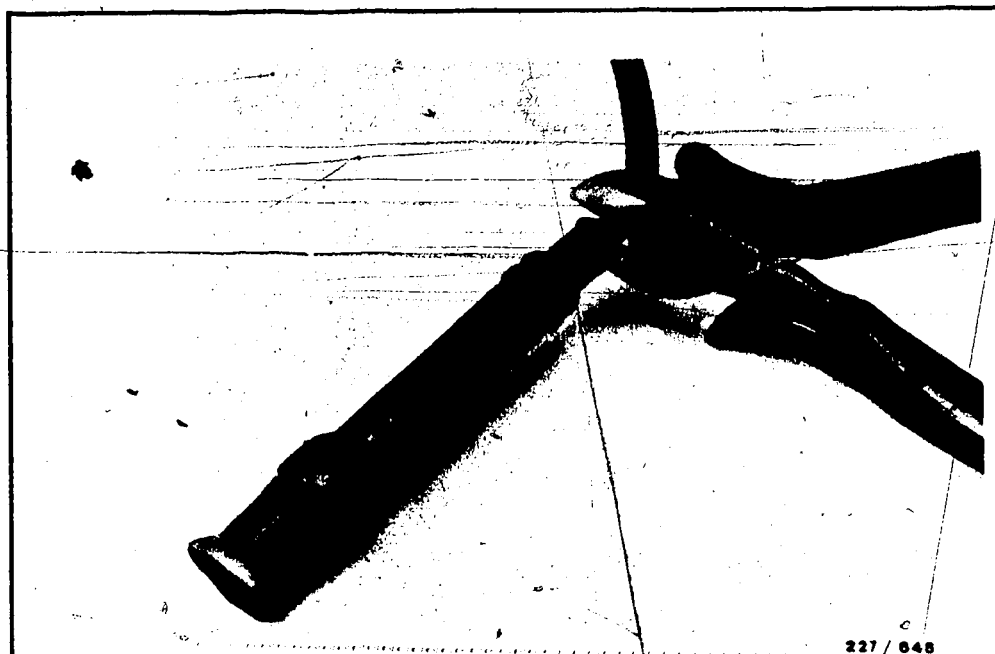
If replacements are required, it is possible to re-order the following parts:

Crimping device	Part No. 121 091
Mounting pliers	Part No. 121 092
Crimping jaw, upper	Part No. 121 093
Crimping jaw, lower	Part No. 121 094
Pressure spindle	Part No. 121 095
Lubricant (labelled in German, English or French)	Part No. 121 098

Order from: C A R T O O L
Hans S c h u b e r t
Alfred-Brehm-Straße 5
D-8070 Ingolstadt/Donau

Motor vehicle service information




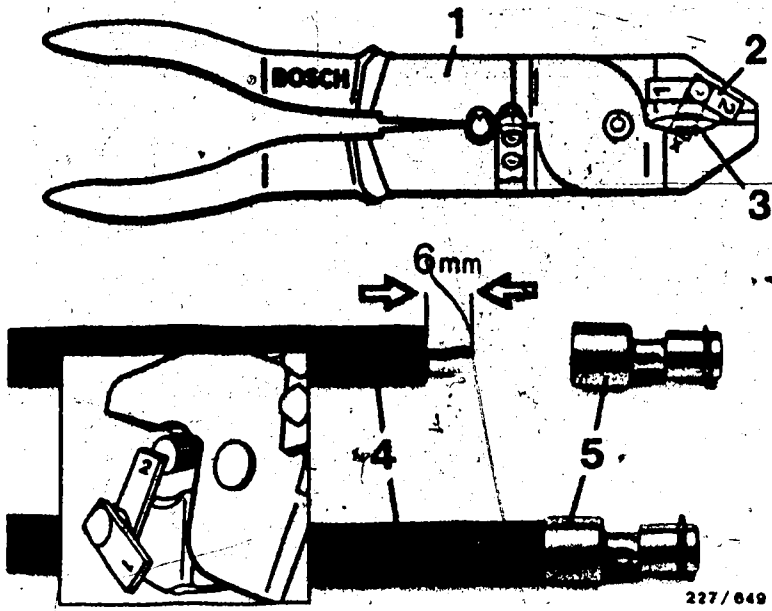


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3. Replacing spark-plug connectors or suppressors

Cut off H.T. ignition cable close to spark-plug connector (see picture).

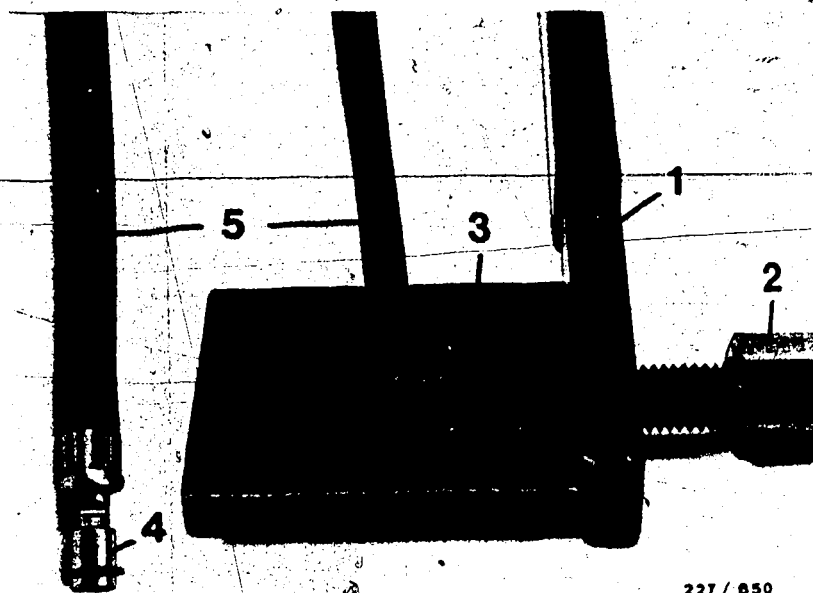
	Motor vehicle service information	
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- 1 = Crimping pliers
- 2 = "Insulation" positioning stop
- 3 = Cutter
- 4 = H.T. ignition cable
- 5 = Connecting piece

Strip off 6 mm of insulation from H.T. ignition cable e.g. with crimping pliers 8 787 954 009 (see picture).

Procedure:
 Bring positioning stop "2" into position "X". Insert H.T. ignition cable into the cutters as far as positioning stop. Press together arms of pliers.
 After the first cut, turn H.T. ignition cable several times and cut again.
 Pull off insulation.
 Slide connecting piece as far as it will go onto H.T. ignition cable.



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- | | |
|--------------------------|-------------------------|
| 1 = Crimping device | 4 = Connecting piece |
| 2 = Clamping jaw screw | 5 = H.T. ignition cable |
| 3 = Movable clamping jaw | |

Open clamping-jaw screw.

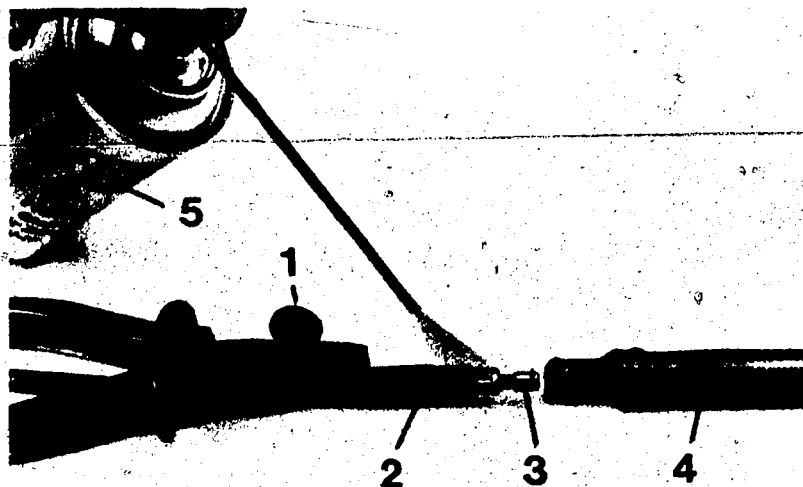
Insert H.T. ignition cable with connecting piece into movable clamping jaw (connecting piece is flush with clamping jaw). Close clamping jaw as far as it will go by turning the clamping-jaw screw.

After crimping, relax clamping jaw and remove H.T. ignition cable.

Perform pull-out test on connecting piece.

	Motor vehicle service information	
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227 / 651

- 1 = Knurled thumb screw
 2 = Guide sleeve
 3 = Connecting piece

- 4 = Spark-plug connector
 5 = Lubricant

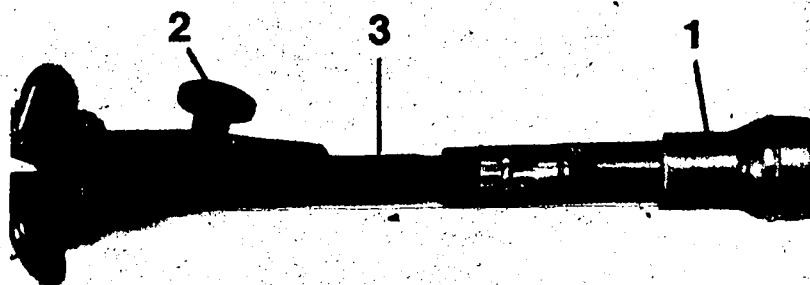
Fully open mounting pliers knurled thumbscrew. Grip H.T. ignition cable directly behind connecting piece with mounting pliers guide sleeve (guide sleeve must grip only the H.T. ignition cable and not the connecting piece) (see picture).

Thinly spray guide sleeve and connecting piece with lubricant.

Insert H.T. ignition cable with mounting pliers into spark-plug connector until connecting piece audibly latches.

Motor vehicle service information





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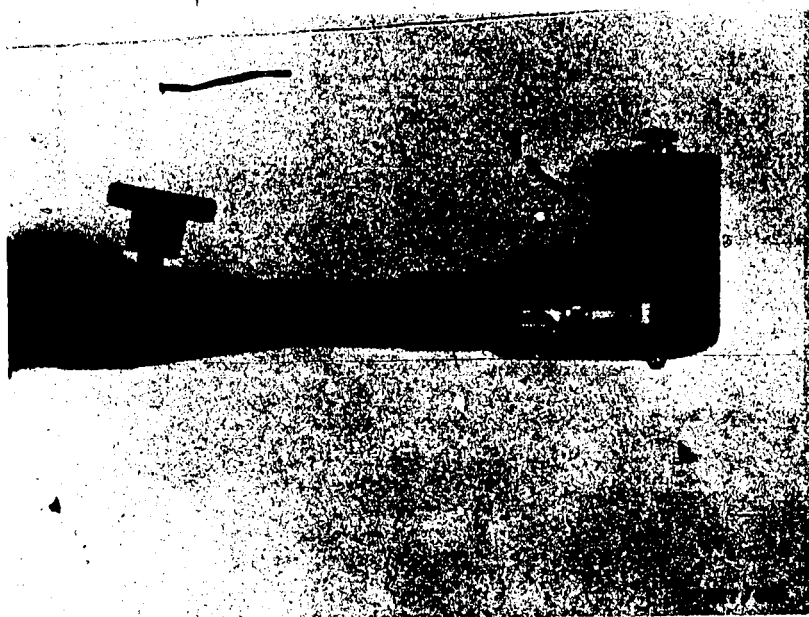
- 1 = Spark-plug connector "cut away"
- 2 = Knurled thumbscrew
- 3 = Guide sleeve

Screw in mounting pliers knurled thumbscrew as far as it will go and carefully withdraw pliers with guide sleeve from spark-plug connector.

Open mounting pliers by hand, but not too wide, otherwise danger of breaking the spark-plug connector.

Motor vehicle can be driven on





1 = Suppressor "cut away".

Procedure as for spark-plug connector.

See illustration.

Published by:

Robert Bosch GmbH
Division KH
After-Sales Service Department
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Motor vehicle service information



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	Register tab	2	Vehicles
	File		
IGNITION DISTRIBUTOR 0237..	Identity		VDT-I-BMW 046 En

for BMW vehicles with 8.1986

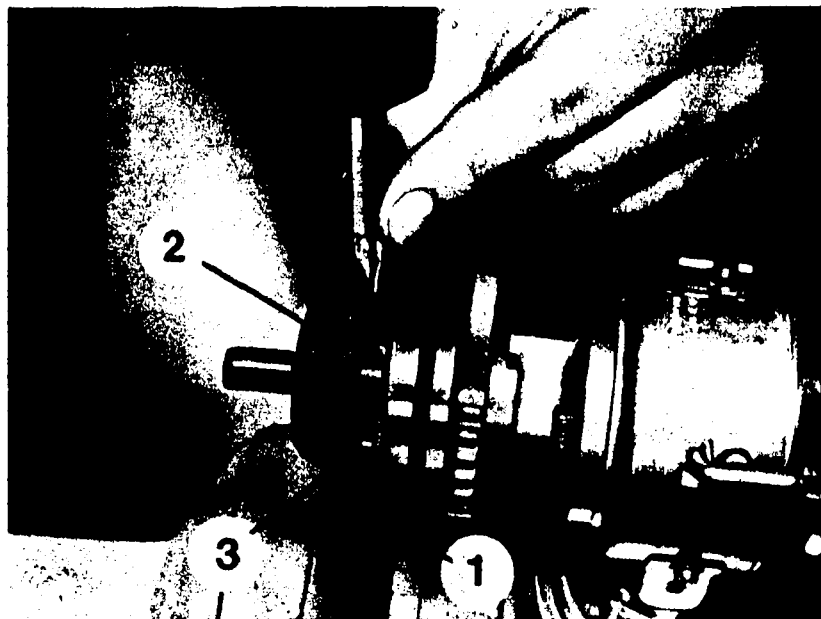
6 cyl. engine M20 2.0l /2.3l/2.5l/2.7l

With respect to the above-mentioned engines,
pay attention to the following before replacing
the ignition distributor:

Check the running face of the distributor
drive gear for wear after disassembling the
ignition distributor. If the distributor drive
gear shows signs of heavy wear, then the
driving gear of the engine jack shaft is
likewise worn. This means that the engine
intermediate shaft must also be replaced. This work
cannot be carried out by Bosch Service, since special
BMW tools are required for removing the engine.
Send customers to BMW.

If the distributor drive gear is O.K., it must
be transferred onto the new ignition distributor.
Replacement ignition distributors are delivered
without distributor drive gear owing to different
versions of engine jack shaft.

SERVICE INFORMATION	SEE>
---------------------	------



- 1 = Holding device
- 2 = Distributor drive gear
- 3 = Bore for swaging procedure

Replacement:

Countersink head of full-length-taper grooved pin with drill bit. Position distributor drive gear in holding device (CARTOOL) and drive out full-length-taper grooved pin with ejector drift. See illustration.

Swage the new full-length-taper grooved pin which has been driven in at both sides.

Carry out swaging procedure in bore of the holding device (illustration, item 3).

Note:

Poor positioning of the distributor drive gear in the holding device causes possible warping of the drive shaft or cracking of the inner bushing. Too inexact fit of the bores - shaft to toothed gear - may lead to cracking of the distributor drive-gear-shoulder bore when driving in the full-length-taper grooved pin.

Part number of the holding device

No. 42 1 150 Price DM 30.75

Source

CARTOOL Co.

Hans Schubert

Alfred- Brehmstraße 5

D-8070 Ingolstadt/Donau

West Germany

Published by:

ROBERT BOSCH GMBH

Division KH

After-Sales Service Department for
Training and Technology (KH/VSK)

Please direct questions and comments
concerning the contents to our
authorized representative in your country.

SERVICE INFORMATION

<==

Citroën Type CX 2200 Diesel

with VA distributor-type fuel-injection pump

VDT-I-CIT 001 B

May 1976

As from April 1976 Citroën will use the distributor-type fuel-injection pump 0 460 394 031 – EP/VA 4/90 H 2250 CL 186 in vehicle CX 2200 Diesel with engine CRD 90 L (4 Cylinder, 4-stroke Diesel, 66 HP – 49 kW – nominal speed 4,500 (rev/min), engine swept volume 2.175 l, firing order 1-3-4-2).

Nozzle-holder Assembly

The nozzle-and-holder assembly 0 432 287 048 is made up of the following parts:

Nozzle-holder assembly	0 432 202 154 – KB 50 S 621/13
Nozzle	0 434 250 060 – DN 0 SD 189

(Opening pressure 120 + 5 bar overpressure)

Fuel Filter

The Puriflex-Filter CP 30 ADK is used: Bosch part number 9 459 990 558. The corresponding fuel-filter element has the part number 9 879 993 013.

After-sales Service Notes

After-sales service is provided in the normal way. The additional technical documents required have been distributed.

1. Technical Documentation

1.1

Repair instructions for EP/VA ... C ...
VDT-WJP 161/4 B, Suppl. 1 ... 3

1.2

Test instructions for EP/VA ... C ...
VDT-WPP 161/4 B, Suppl. 1, 2

1.3

For technical information see document list under "Distributor-type Pumps".
VDT-W-000/50

1.4

Service Parts List and Test Specification on microfiche.

1.5 Tools

1.5.1

For tools used on the test bench see WA-Catalog "Workshop Equipment Accessories" and "Special Accessories for Injection Pump Test Benches".
WA-VKF 053 1

1.5.2

Assembly Tools (After-sales Service Tools)
KD Tool Catalog
VDT AHA 060-1 of July 1973 including Catalog Sheet KD-EP 9 D of Nov. 1975.

2. Matching the Pump to the Engine

The matching of the distributor-type fuel-injection pump follows the dial indicator method

Setting Point

Pump at a plunger stroke of 0.45 mm after BDC
Engine 12 BTDC plunger stroke 1.19 mm before TDC

Please order the necessary service parts in good time so that efficient after-sales service can be provided.

Please get in touch with the Citroën representative in your area and offer him your servicing facilities.

BOSCH

Geschäftsbereich KH Kundendienst Kfz Ausüstung
* by Robert Bosch GmbH D 7 Stuttgart 1, Postfach 50 Printed in the Federal Republic of Germany
Imprimé en République Fédérale d'Allemagne par Robert Bosch GmbH

Robert Bosch GmbH, After-Sales Service, Automotive Equipment.
Not to be communicated to any third party.

	Register, tab	2 vehicles
	File	
CITROEN BX WITH XUD 9 ENGINE	Identity	VDT-1-CIT 005 En
Insufficient load pick-up		12.1986
at idle		

Nr. 0 460 494 195
VE R 162-1
Type 518
961 648 C 123456

A

B

C

A = Works code no. B = Date of manufacture (FD)
C = Serial number

With this vehicle, it may come about in isolated cases that load pick-up is insufficient at idle. This expresses itself through an excessive drop in idle speed, e.g., when electrical consuming devices are switched on.

The engine "shakes" and the vibrations are clearly noticeable in the passenger compartment. The same effect can arise on sudden release of the accelerator.

SERVICE INFORMATION

***>

The cause of this is a faulty idle spring in the distributor-type fuel-injection pump. However, this fault can arise only in fuel-injection pumps with the works code no. 961 and which are stamped with the dates of manufacture 647 (7.1986) up to 649 (9.1986) (see figure).

The complaint can be eliminated by exchange of the idle spring in accordance with VDT-I-460/147.

Within the warranty period, this operation will be carried out for the customer free of charge.

Fuel-injection pumps which have the above-stated works code no. and dates of manufacture, but also have a white dot on the control lever have already been equipped at the works with the correct idle spring and do not need attention. The complaint has other causes which must be determined.

Published by:

ROBERT BOSCH GMBH
Division KH
Technical After-Sales Service (KH/VK02)

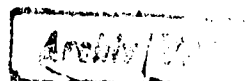
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concerning the contents to our authorized
representative in your country.

SERVICE INFORMATION

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Datsun Skyline

Model Series C 210 Engine L 24 E



VDT-I-DAT 002 En
10.1980

Replaces edition 3.1980

Datsun 280 ZX

Model Series S 130 Engine L 28 E

BOSCH

Geschäftsbereich KH Kundendienst Kfz-Ausrüstung
by Robert Bosch GmbH D 7 Stuttgart 1 Postfach 10 Printed in the Federal Republic of Germany
imprimé en République Fédérale d'Allemagne par Robert Bosch GmbH

This publication has been redesigned with the forthcoming change-over to microfilm in mind.

When a publication has been transferred to microfilm, the screen will be filled completely by a quarter of a printed publication page. For this reason, it is unavoidable that illustrations are repeated in the case of longer texts in which reference is constantly being made to a particular illustration.

Until the change-over to microfilm, we have slightly reduced the size of the print and of the illustrations.

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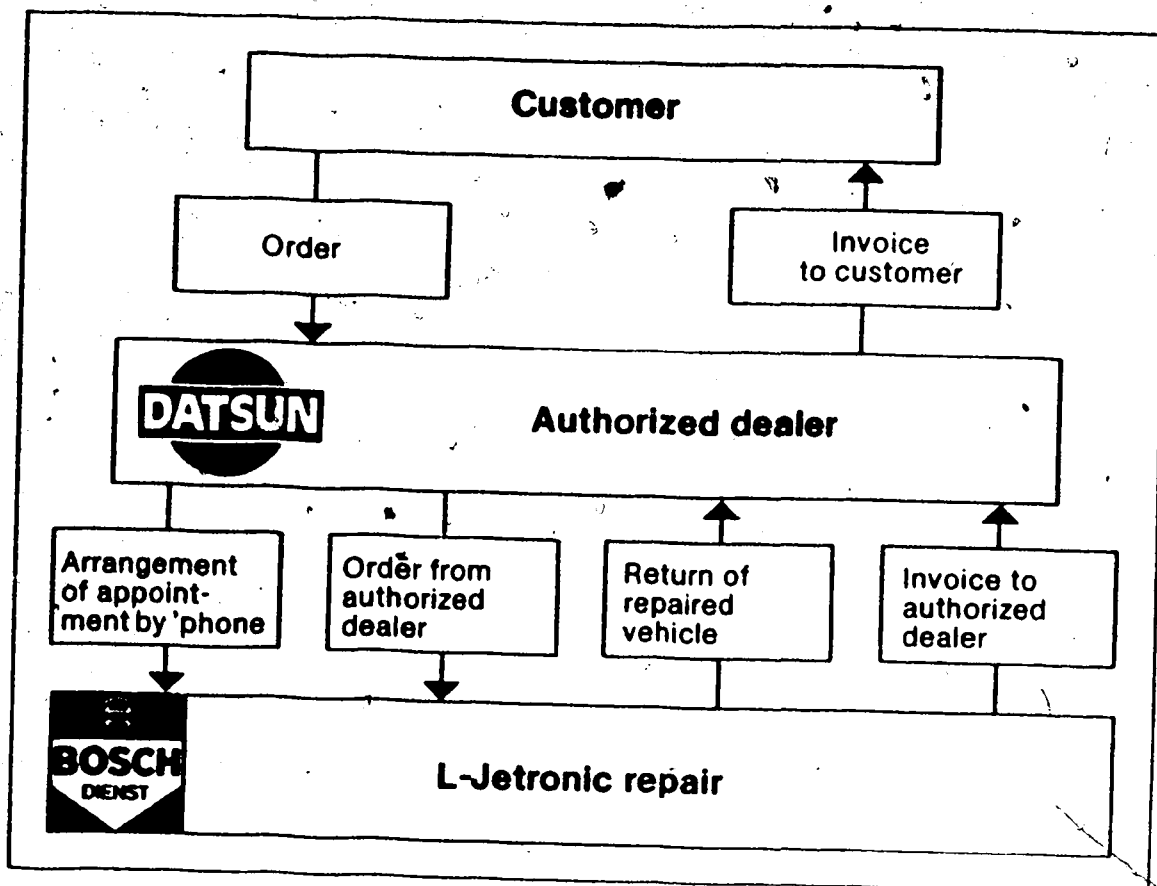
2	1.	General
2	2.	Procedure for cooperation
3	3.	Ignition system
3	3.1	Information on ignition system
3	4.	Arrangement of components in vehicle
4	5.	Fuel system
4	6.	Testing and adjustment
4	6.1	Fuel pressure test
5	6.2	Throttle-valve switch
5	6.3	Exhaust gas
5	6.3.1	General
5	6.3.2	Setting the CO concentration
5	7.	Technical data
6	8.	Test chart for L-Jetronic with analog tester
8	9.	Circuit diagrams
8	9.1	Datsun Skyline
8	9.2	Datsun 280 ZX

1. General

Nissan Motor Deutschland GmbH has for some time been supplying the Skyline and 280 ZX models. These vehicles are equipped with an L-Jetronic system, the components for which are manufactured in Japan under Bosch licence.

In order to service these vehicles sold in the Federal Republic of Germany, Nissan Motor Deutschland and Bosch have agreed that Datsun dealers may, when necessary, bring problem vehicles to a Bosch service station for repair of the Jetronic system.

In this publication, we have compiled all the necessary information - the technical portion according to Datsun Service documentation.



2. Procedure for cooperation

Nissan and Bosch wish to cooperate as partners as regards the Jetronic.

Nissan Motor Deutschland GmbH has informed its Datsun dealer organization that vehicles may be taken to a Bosch service station for the checking and repairing of the Jetronic system. The Datsun dealer is in this sense a customer.

The service parts required for repairing the vehicle are provided free of charge by the Datsun dealer.

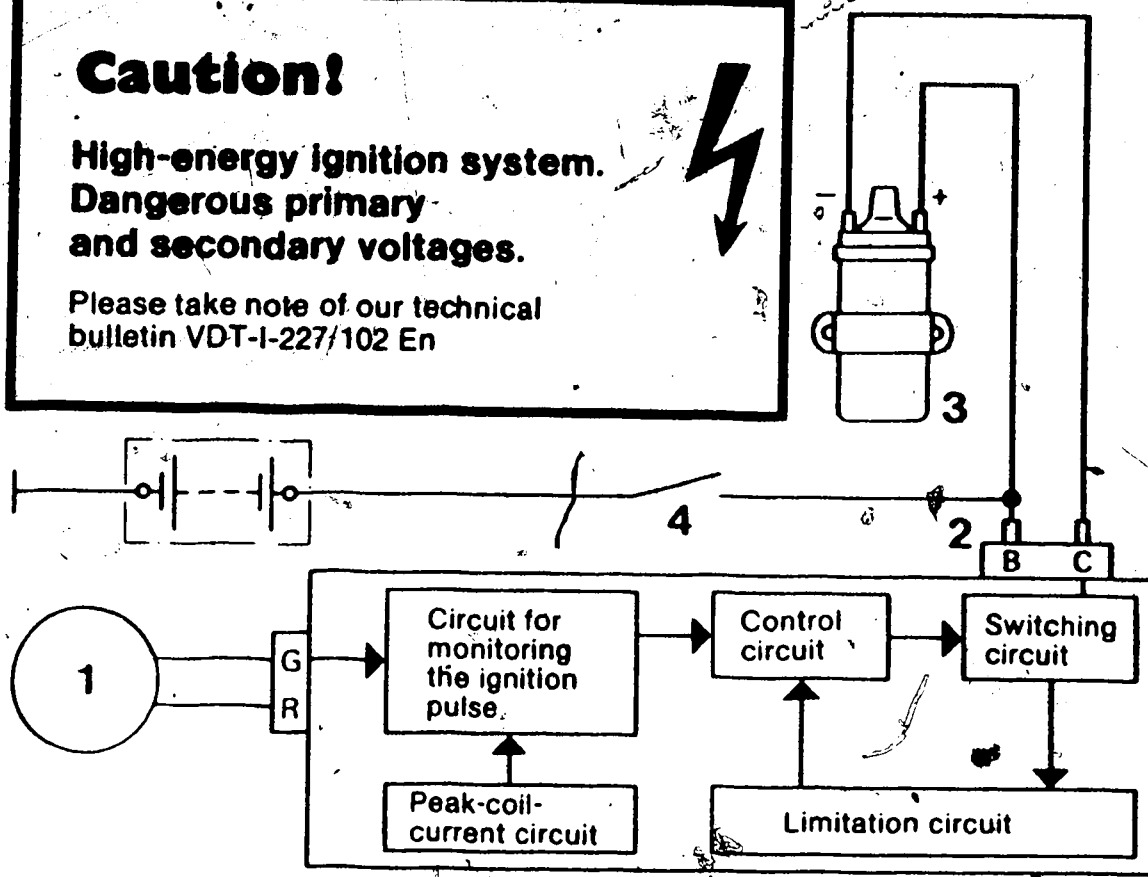
The Bosch service station charges the Datsun dealer for the labour spent on the repair. Within and after the warranty period on the vehicle the invoice must contain a precise description of the defect(s).

If the owner of a Datsun vehicle approaches a Bosch service station directly, the necessary service parts may be purchased from a Datsun dealer at a special discount.

Caution!

**High-energy ignition system.
Dangerous primary
and secondary voltages.**

Please take note of our technical
bulletin VDT-I-227/102 En



3. Ignition system

The ignition system is a breakerless transistorized ignition system with induction-type pulse generator (TCI-i), without ballast resistor.

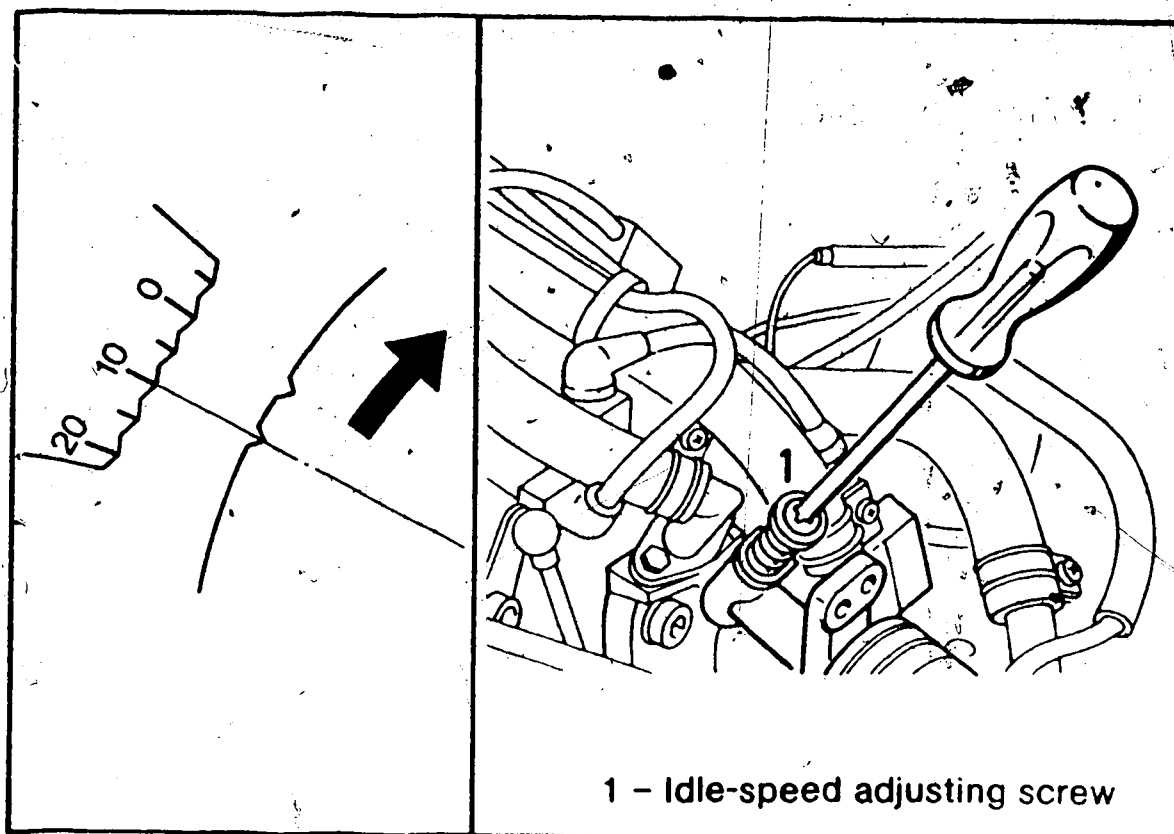
The trigger box is screwed directly onto the ignition distributor and has the following additional functions:

Peak-coil-current cut-off

Dwell-angle control

Current-regulated output stage

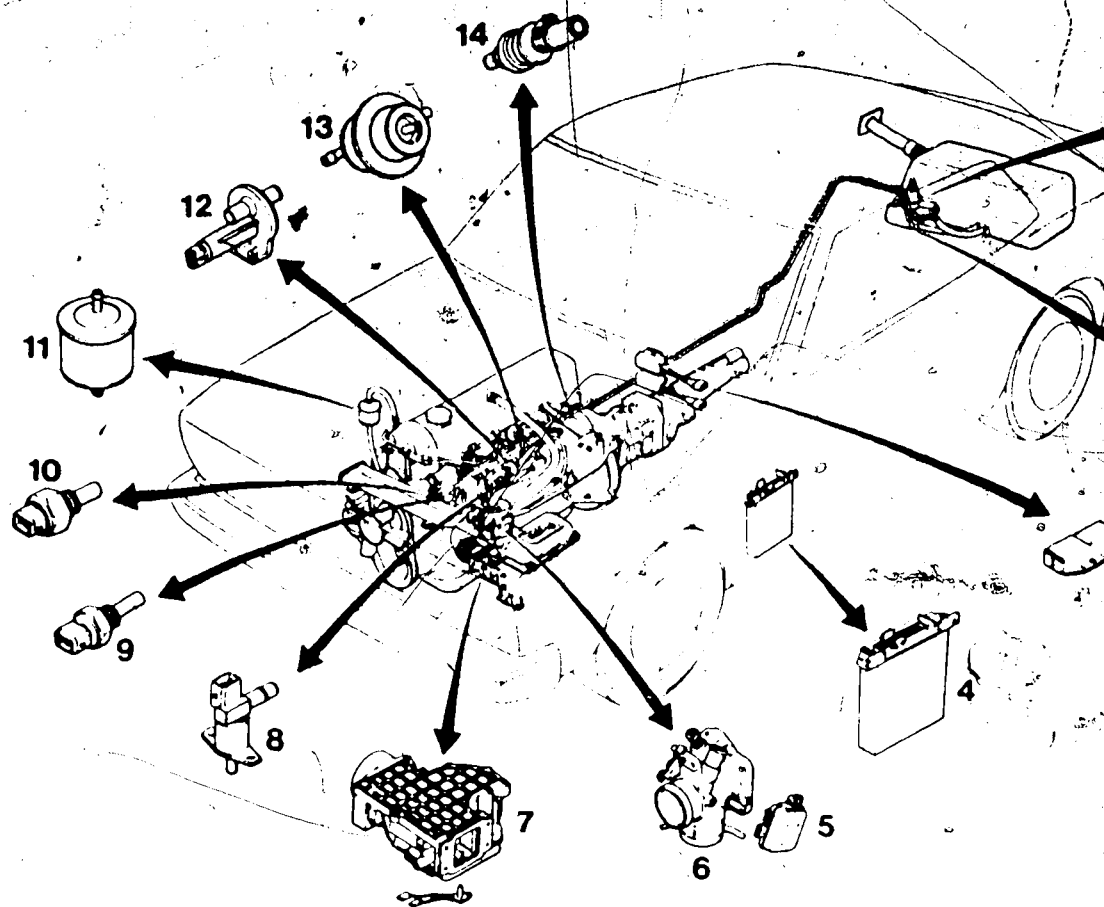
The system corresponds approximately to that described in Technical Bulletin "New Product" VDT-I-227/3.



3.1 Information on Ignition system

Ignition coil	Primary resistance	0.84 ... 1.02 Ω
Spark plug	Electrode gap	1.0 ... 1.1 mm
Idle speed	Manually-shifted transmission	700 min ⁻¹
	Automatic in "N" mode	750 min ⁻¹
Ignition point	At idle speed with vacuum	10° before TDC
Ignition distributor	Resistance of pulse generator	Approx. 400 Ω
	Air gap	0.3 ... 0.5 mm

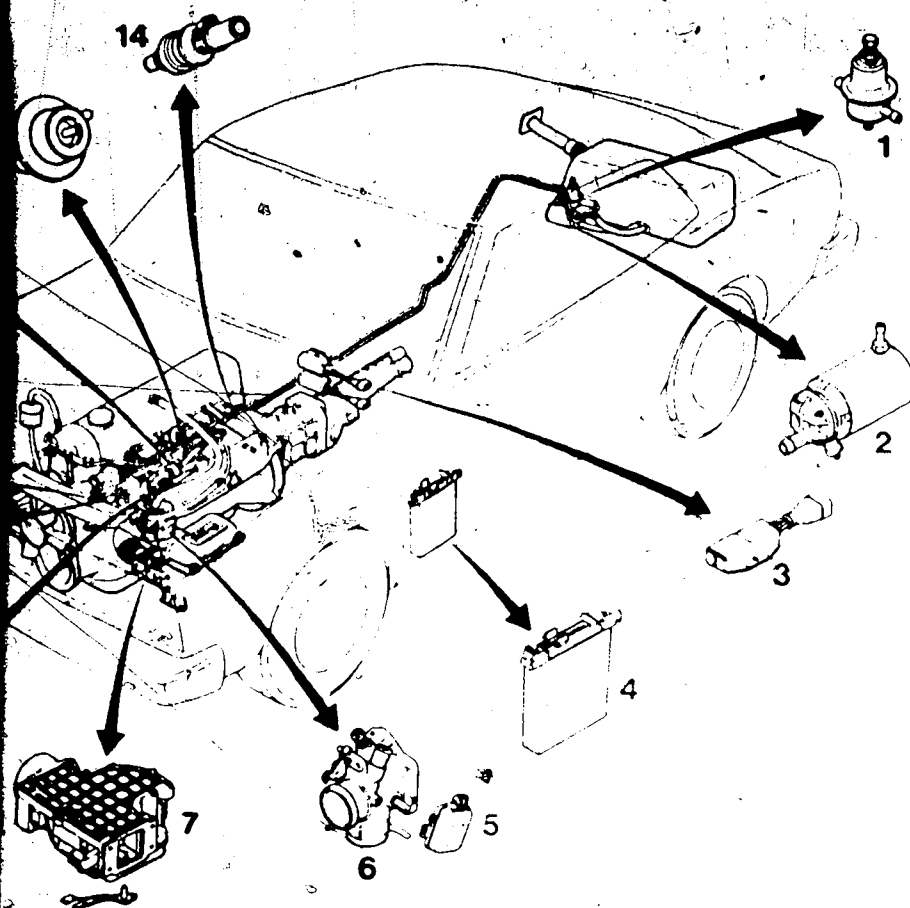
Type	Engine	Centrifugal advance at distributor-shaft speed		Vacuum advance	
D 6 K 7-2	L 24 E	500 min ⁻¹	0°	135 mbar	0°
		1250 min ⁻¹	8°	400 mbar	12.5°
D 6 K 7-4	L 28 E	500 min ⁻¹	0°	200 mbar	0°
		1200 min ⁻¹	7.5°	400 mbar	7.5°



4. Arrangement of components in vehicle

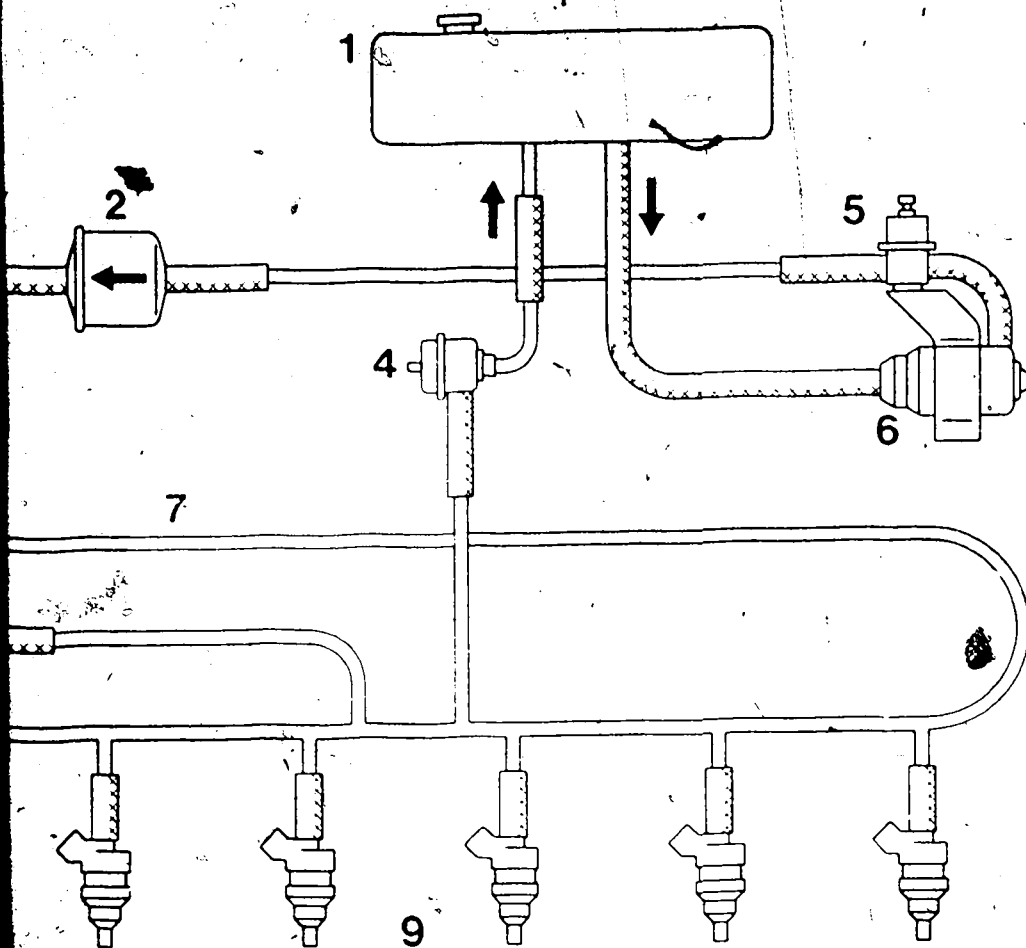
- | | |
|-------------------------------|--------------------------------|
| 1 - Fuel-line-pressure-damper | 8 - Start valve |
| 2 - Fuel pump | 9 - Temperature sensor (water) |
| 3 - Series resistor | 10 - Thermo-time switch |
| 4 - Control unit | 11 - Fuel filter |
| 5 - Throttle-valve switch | 12 - Auxiliary-air device |
| 6 - Throttle-valve assembly | 13 - Pressure regulator |
| 7 - Air-flow sensor | 14 - Injection valve |

C24



nts in vehicle

- 8 - Start valve
- 9 - Temperature sensor (water)
- 10 - Thermo-time switch
- 11 - Fuel filter
- 12 - Auxilliary-air device
- 13 - Pressure regulator
- 14 - Injection valve



m

Pressure gauge here
regulator

- 5 - Fuel-line-pressure damper
- 6 - Fuel pump
- 7 - Fuel ring main
- 7 - Start valve
- 9 - Injection valves

6. Testing and adjustment

The sequence for testing and trouble-shooting corresponds approximately to that given in VDT-W-280/501.

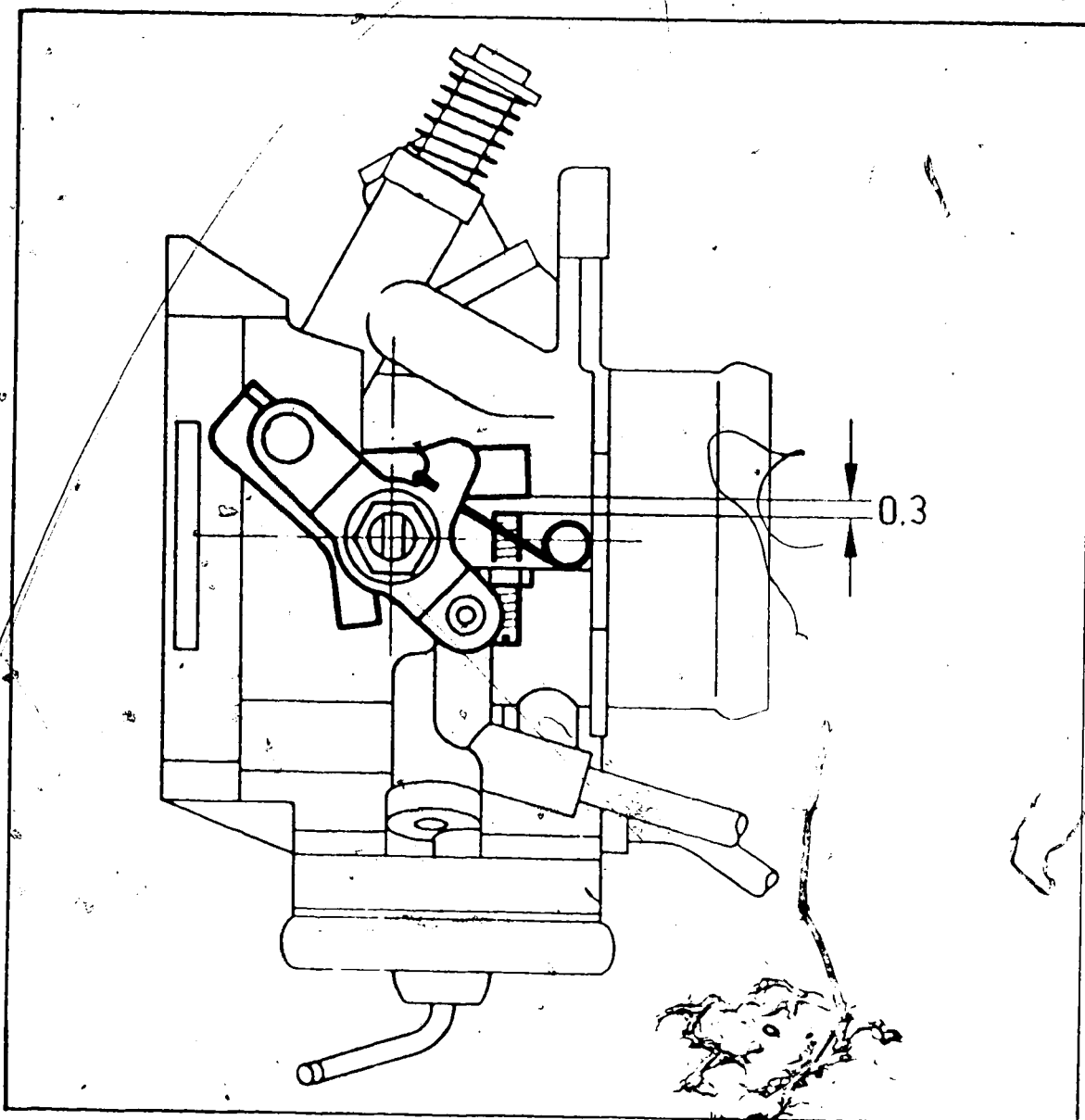
6.1 Fuel pressure test

Disconnect hose from fuel filter outlet and connect pressure gauge (0 ... 6 bar).

Connection hoses and Y-piece can be taken over from the D-Jetronic tester.

Disconnect vacuum hose of pressure regulator from intake manifold. Start engine. Fuel pressure 2.5 ± 0.2 bar.

Re-connect vacuum hose; fuel pressure drops to approx. 2 bar and rises again when the throttle valve is opened. If not, check vacuum hose for leaks and proper attachment.

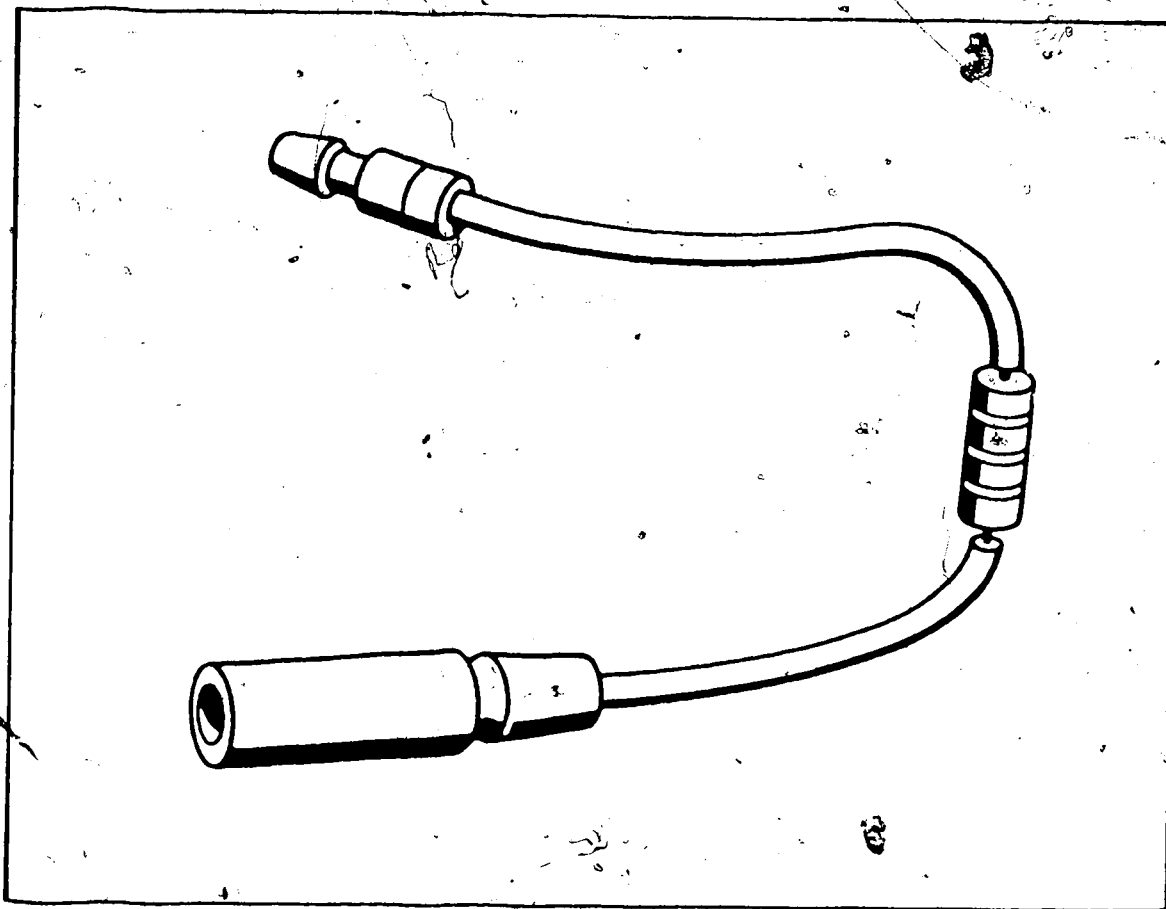


6.2 Throttle-valve switch

Remove connector from throttle-valve switch. Connect ohmmeter between term. 2 and term. 18 of throttle-valve switch and check for continuity.

The throttle-valve switch should be fitted so that it switches from "on" to "off" at an engine speed of approx. 900 min^{-1} .

To adjust the installation position of the throttle valve switch with the engine stopped, a 0.3 mm feeler gauge is placed between throttle-valve stop screw and stop lever (see diagram). The "on/off" switching point should be at this throttle valve position (corresponding to approx. 900 min^{-1} position).



6.3 Exhaust gas

6.3.1 General

A standard CO analyzer operating according to the heat tone principle does not show any measurable CO concentration in the case of fuel-injection engines. For this reason, the mixture is enriched by fitting a 1.2 k Ω resistor into the line of the water temperature sensor.

An additional quantity of fuel is injected due to the increased total resistance of the water temperature sensor. The CO concentration becomes correspondingly greater and can be read off on the CO analyzer.

If the reading is above or below, the mixture must be adjusted by turning the bypass screw in the air-flow sensor.

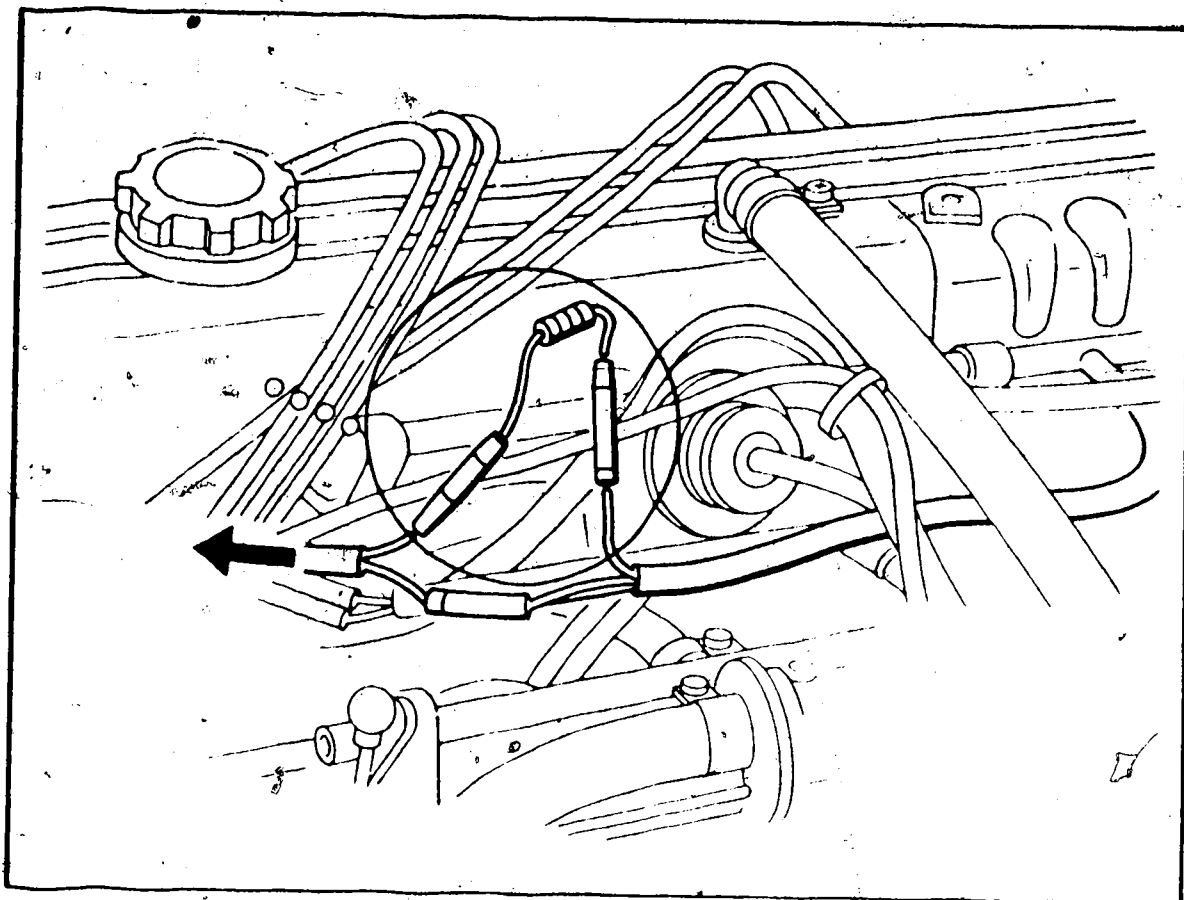
The bypass screw located on the side of the air-flow sensor housing is usually sealed with a metal plug and must be drilled out to 4 mm diameter.

If the mixture is too lean, screw in the bypass screw; if it is too rich, screw out the bypass screw.

After setting 3.3% CO concentration, increase the engine speed slightly for a brief period, then measure the CO concentration again at idle. Readjust if necessary.

When the resistor is fitted into the water temperature sensor line, the idle speed rises by approx. 100 min^{-1} . This increased idle speed must not be changed.

When, after setting the CO concentration, the $1.2 \text{ k}\Omega$ resistor is removed again, the idle speed must drop to the previously set value of 700 or 750 min^{-1} . If the speed differs by more than 50 min^{-1} from the set idle speed, the idle speed must be adjusted and the CO concentration re-measured.



6.3.2 Setting the CO concentration

Bring the engine to normal operating temperature and set the idle speed:

Manually-shifted transmission	700 min ⁻¹
Automatic in "N" mode	750 min ⁻¹

Switch off engine. Fit 1.2 k Ω resistor into one of the black lines (13 or 49) of the water temperature sensor. Connect CO analyzer and start engine

Nominal CO concentration 3.3% by vol.

7. Technical data

Fuel pump	Fuel delivery	1.5 ... 2.0 l/min
Pressure regulator	Fuel pressure	2.5 ± 0.2 bar
Start valve	Qty. of fuel injected	135 cm ³ /min
Thermo-time switch	Switching temperature	$19.5^\circ \pm 5^\circ$ C
	Shutoff time	9 sec.
Injection valves	Winding resistance	2.35 Ω
Throttle-valve switch	Switching speed	approx. 900 min ⁻¹

8. Test chart for Datsun Skyline and 280 ZX

1. Connect tester between control unit and Jetronic wiring harness. Ignition "off". Plug the plugs on carefully. Check contacts of multiple plug for correct position.
2. Ignition "on" for all test steps.

Test step	Operation				Reading		Testing	Testing
	Cylinder switch pos.	Program switch position	Press program push-button	Other	Instrument V, Ω , ms	Lamp	Components	Operation
1.1	6	①			0 V		Various	Voltage at control unit term. 4 due to short circuit
1.2						Red		Voltage supply
1.3	●	●		Shift gear to neutral, operate starting motor	8 15 V	Red	Starting motor term 50	Instrument: Voltage at control unit term. 4

0 ZX

tronic wiring harness. Ignition "off".
of multiple plug for correct position.

● Switch position unchanged

X Press push-button

① and ② Operation in vehicle

Lamp		Testing Components	Testing Operation	Malfuction	Trouble-shooting
		Various	Voltage at control unit term. 4 due to short circuit	Voltage reading	For testing, disconnect wiring-harness plug from analog tester. Short circuit in wiring harness to cable term. 50, multiple plug term. 4 or in relay (7 and 15).
	Red		Voltage supply	Red lamp does not light up	Check ground cable from relay (7 and 15) to body, and check cable from multiple plug term. 5 to central ground for a break using ohmmeter (set value 0 Ω). Check voltage with ignition switched on at relay 12 (term. 10 and 43), multiple plug term. 10; if necessary, eliminate line break or contact resistance or replace relay (12).
	Red	Starting motor term 50	Instrument Voltage at control unit term 4	No voltage reading	Voltage reading below 8V: Battery insufficiently charged or high voltage drops. No voltage reading: Check voltage when starting at relay (7), multiple plug term. 4. If necessary, look for a broken cable or replace relay (7).

02

1.4						Green flickers		Green lamp: Triggering from ignition coil term. 1
2.1	●	2		Balance knob: Set point- er to 15 V	15 V	Red	Tester	Matching the indicator instrument to battery voltage
2.2	●	●	X		5 ... 9 V	Red	Air-flow sensor	Potentiometer in air-flow sensor (air-flow sensor flap in rest position)
3.1	●	3	X		25 90 Ω	Red	Auxiliary-air device and fuel pump	Joint resistance between auxiliary- air device and fuel pump from control unit term. 34 and ground

	Green flickers		Green lamp: Triggering from ignition coil term. 1	Green lamp does not flicker	Check cable 1 from ignition coil term. 1 through plug connector to multiple plug term. 1 for a break.
	Red	Tester	Matching the indicator instrument to battery voltage	Matching not possible	Tester defective.
	Red	Air-flow sensor	Potentiometer in air-flow sensor (air-flow sensor flap in rest position)	No reading or reading differs from set value	Check cables from air-flow sensor to multiple plug for a break using ohmmeter: Terminals 6, 7, 8 and 9 at both components. Voltage drops at the plug contacts. Replace or clean air-flow sensor and check air-flow sensor flap for freedom of movement.
Ω	Red	Auxiliary-air device and fuel pump	Joint resistance between auxiliary-air device and fuel pump from control unit term. 34 and ground	Resistance outside tolerance	Resistance between auxiliary-air device term. 34 and 48: approx. 50 Ω . Resistance between relay (7) and ground: approx. 1 Ω . In case of a break, check ground cable and positive cable to pump. Check following connections for breaks using ohmmeter: Multiple plug term. 34 - auxiliary-air-device term. 34, auxiliary-air device term. 48. Check plug-in connections.

8. Test chart (continued)

Test step	Operation				Reading		Testing	Testing
	Cylinder switch pos.	Program switch position	Press program push-button	Other	Instrument	Lamp	Components	Operation
					V, Ω , ms			
4.1	●	4			(Depends on temperature)	Red	Temperature sensor II Engine	Resistance between control unit term. 13 and central ground through temperature sensor II
4.2	●	●	X		(Depends on temperature)	Red	Temperature sensor I (air) in air-flow sensor	Resistance between control unit term. 27 and central ground
5.1	●	5		Accelerator in rest position	0 Ω	Red	Throttle-valve switch	Resistance between term. 18 and term 2 on throttle-valve switch (idle contact)

0:0

● Switch position unchanged

X Press push-button

① and ② Operation in vehicle

Reading		Testing	Testing		Trouble-shooting
Component	Lamp	Components	Operation	Malfunction	For testing, disconnect wiring-harness plug from analog tester.
Temperature sensor II (air-flow sensor II)	Red	Temperature sensor II Engine	Resistance between control unit term. 13 and central ground through temperature sensor II	Resistance outside tolerance	Measure resistance directly at temperature sensor II or air-flow sensor (term. 27 and term. 6): -10° C: 7 ... 12 kΩ +20° C: 2 ... 3 kΩ +80° C: 250 ... 400 Ω
Temperature sensor I (air-flow sensor I)	Red	Temperature sensor I (air) in air-flow sensor	Resistance between control unit term. 27 and central ground	Resistance outside tolerance	Check following cables for a break using ohmmeter: Temperature sensor I: Multiple plug term. 27 - air-flow sensor term. 27 Temperature sensor II: Multiple plug term. 13 - temperature sensor II term. 13, temperature sensor II term. 49 - central ground (cable 49) - check plug-in connections.
Throttle-valve switch	Red	Throttle-valve switch	Resistance between term. 18 and term. 2 on throttle-valve switch (idle contact)	No 0 Ω reading	Throttle valve switch not adjustable. Check plug-in connections. Direct resistance measurements at throttle-valve switch between term. 18 - term. 2. If necessary, replace throttle-valve switch or adjust throttle valve. Check following cables for a break using ohmmeter: Multiple plug term. 2 - throttle-valve switch term. 2, throttle-valve switch term. 18 - multiple plug term. 18.

5.2	●	●		Accel- erator in part-load position	$\infty \Omega$	Red	Throttle- valve switch	Resistance between throttle- valve switch term 18 and term. 2
5.3	●	●		Accel- erator pressed all the way down	0 Ω	Red		Resistance between term. 18 and term. 3 on throttle-valve switch (full-load contact)
6	●	6			8.57 ... 12.91 ms	Red	Control unit	Starting enrichment
7	●	7			3.72 ... 5.24 ms ¹⁾	Red		Warm-up
8.1	●	8			2.86 ... 4.10 ms	Red		Basic matching I
8.2	●	●	X		3.10 ... 4.54 ms ²⁾	Red		Full-load compensation
9	●	9			1.53 ... 2.78 ms	Red		Basic matching II
10.1	●	10			5.43 ... 7.21 ms	Red		Basic matching III
10.2	●	●		Check each injection valve by hand to determine whether needle movement can be felt			Injection valves	Needle movement

¹⁾ Min. 30 sec. after switching program switch from 6 to 7

²⁾ Reading must be greater than in test step 8.1

	Red	Throttle-valve switch	Resistance between throttle-valve switch term 18 and term. 2	0 Ω or slight resistance	Check cables from throttle-valve switch (term. 2, 3 and 18) to multiple plug for short circuit. Throttle-valve switch defective.
	Red		Resistance between term. 18 and term. 3 on throttle-valve switch (full-load contact)	No 0 Ω reading	Does throttle valve open fully? Check adjustment of throttle linkage. Check plug-in connections. Direct resistance measurement at throttle-valve switch between term. 18 and 3 (open throttle valve fully). If necessary, replace throttle-valve switch. Check cable from multiple plug term. 3 to throttle-valve switch term. 3 for a break.
91 ms	Red	Control unit	Starting enrichment	No reading	No reading for test steps 6 ... 10.1: check central ground terminal. Check cable from multiple plug term. 16 and 17 to central ground for a break. Check power supply to injection valves using voltmeter: battery voltage at relay (12) and series resistor (21 and 22) term. 43. Check plug-in connections at relay (12) and series resistor (21 and 22). If necessary, eliminate line break or replace relay (12) or series resistor. Control unit defective. Reading outside tolerance. Carry out test step 10.2. If O.K. check plug-in connection to control unit or replace control unit.
24 ms ¹⁾	Red		Warm-up	or reading outside tolerance	
10 ms	Red		Basic matching I		
54 ms ²⁾	Red		Full-load compensation		
78 ms	Red		Basic matching II		
21 ms	Red		Basic matching III		
		Injection valves	Needle movement	Needle movement cannot be felt	Detach valve connector and plug into a serviceable valve. If needle movement can now be felt, the valve originally fitted is defective*). If needle movement cannot be felt, check the corresponding cables to multiple plug and series resistor for a break. Measure resistance of series resistor: 5 ... 7 Ω . Check plug-in connections.

ch from 6 to 7
p 8.1

*) Winding resistance of valve 2 ... 3 Ω .

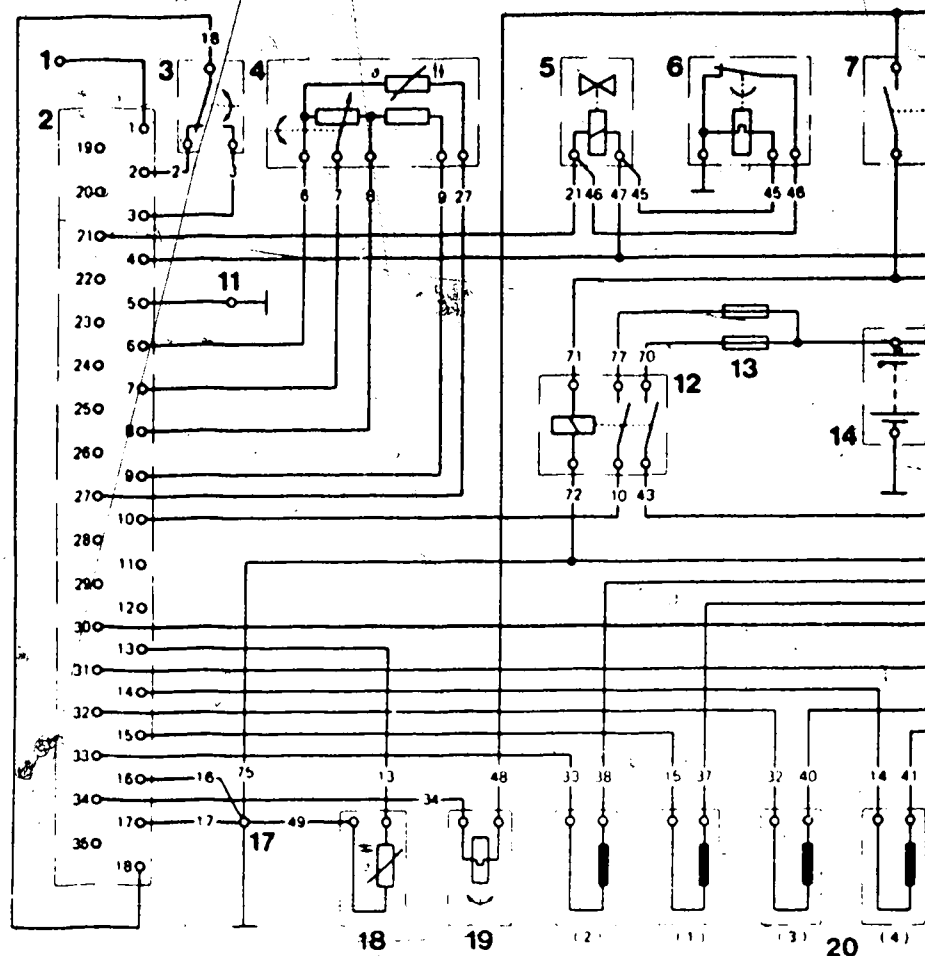
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9. Circuit diagrams

9.1 Datsun Skyline



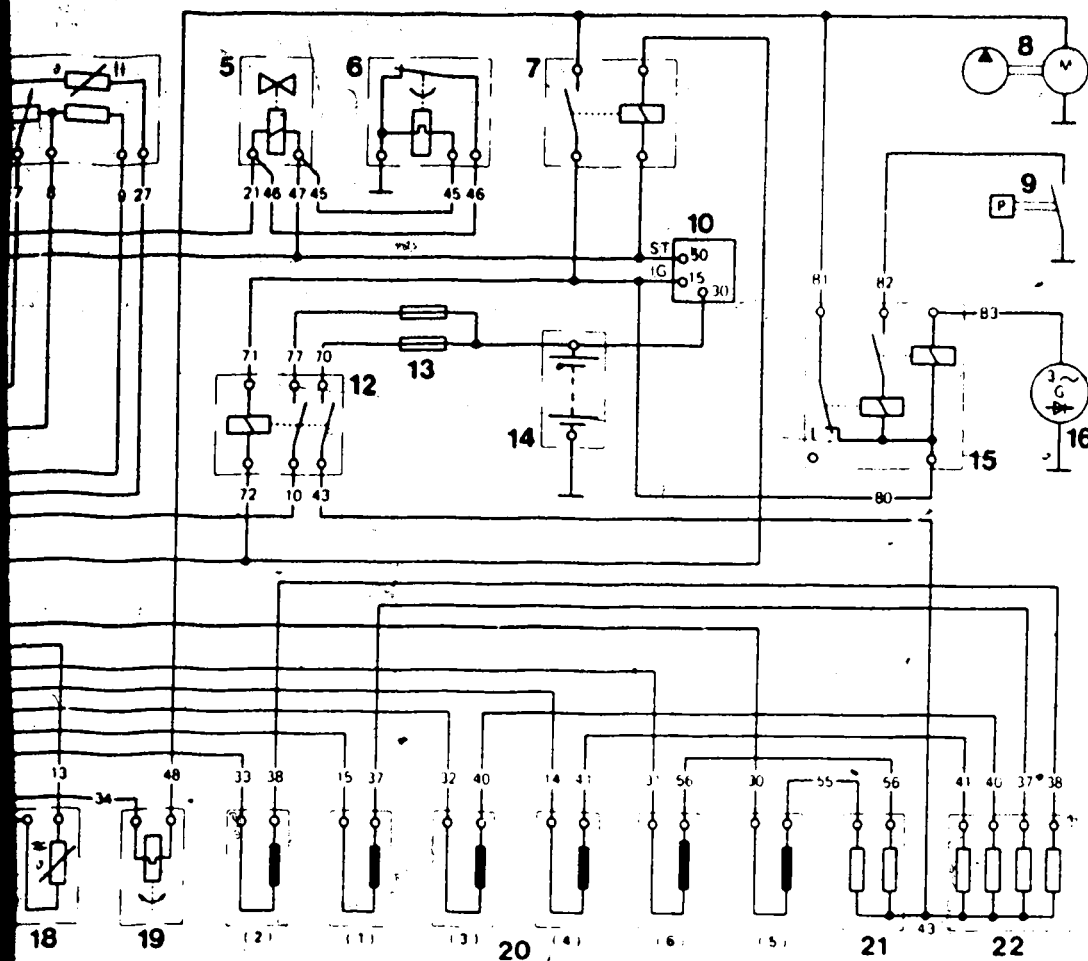
Explanation of circuit diagram

- 1 - To ignition coil term. 1
- 2 - Multiple plug of control unit
- 3 - Throttle-valve switch
- 4 - Air-flow sensor
- 5 - Start valve
- 6 - Thermo-time switch

- 7 - Pump relay I
- 8 - Fuel pump
- 9 - Oil-pressure switch
- 10 - Ignition and starting switch
- 11 - Central ground

- 12 - Control unit
- 13 - Fuses
- 14 - Battery
- 15 - Pump relay
- 16 - Generator

D 14



1 - Relay I
 2 - Pump
 3 - Pressure switch
 4 - Ignition and starting switch
 5 - Central ground

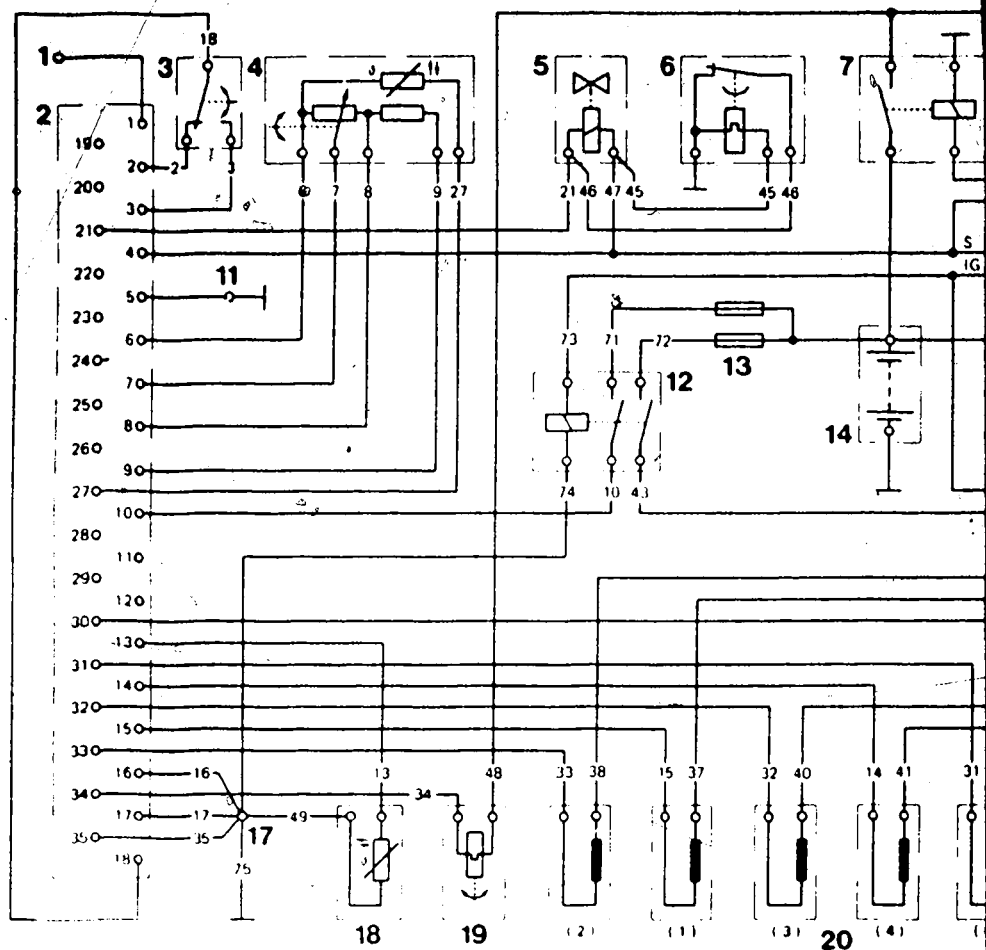
12 - Control unit relay
 13 - Fuses
 14 - Battery
 15 - Pump relay II
 16 - Generator

17 - Central ground
 18 - Temperature sensor (water)
 19 - Auxiliary-air device
 20 - Injection valves
 21 } Series resistor
 22 }

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9.2 Datsun 280 ZX

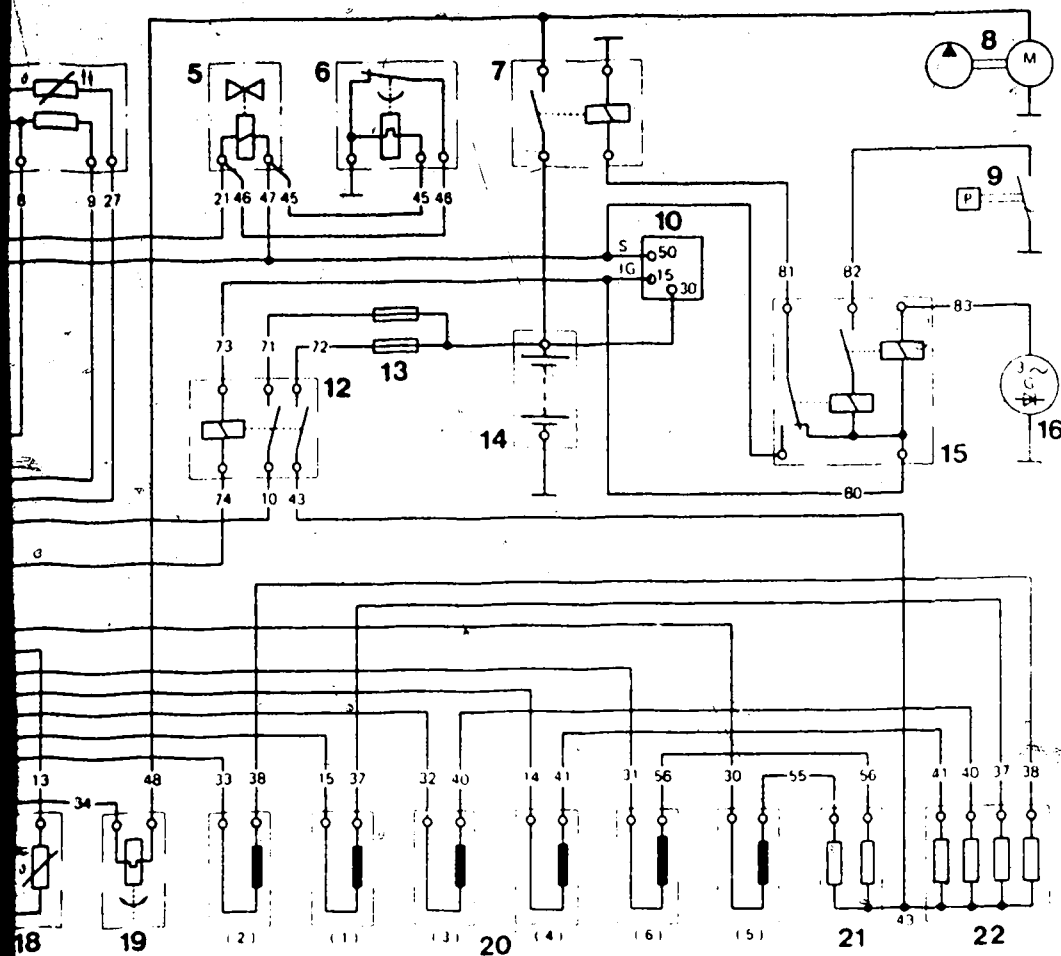


Explanation of circuit diagram

- 1 - To ignition coil term 1
- 2 - Multiple plug of control unit
- 3 - Throttle-valve switch
- 4 - Air-flow sensor
- 5 - Start valve
- 6 - Thermo-time switch

- 7 - Pump relay I
- 8 - Fuel pump
- 9 - Oil-pressure switch
- 10 - Ignition and starting switch
- 11 - Central ground

- 12 - Control unit re
- 13 - Fuses
- 14 - Battery
- 15 - Pump relay II
- 16 - Generator



1 - Pump relay I
 2 - Pump
 3 - Pressure switch
 4 - Ignition and starting switch
 5 - Central ground

12 - Control unit relay
 13 - Fuses
 14 - Battery
 15 - Pump relay II
 16 - Generator

17 - Central ground
 18 - Temperature sensor (water)
 19 - Auxiliary-air device
 20 - Injection valves
 21 } Series resistor
 22 }

MODIFICATION TO PIN ASSIGNMENT
ON L-JETRONIC CONTROL UNIT

VDT-I-DAT 003 En
4.1982

Datsun model series 910, S110, S130 as of July 1981

Vehicle test with L-Jetronic tester (analog) ETJ 002.02.

The pin assignment on the electronic L-Jetronic control units has been modified on the above-mentioned Datsun models.

For the functional test of wiring harness and new control unit in the vehicle using the L-Jetronic tester (analog) ETJ 002.02, two adapter leads are additionally required since if the L-Jetronic tester is directly connected, the control unit and the wiring harness will be destroyed as a result of short-circuiting.

New control unit

1. Reference plate in English on bottom side of housing.
2. Blue, instead of black, control unit connector on vehicle wiring harness.

Adapter lead 1, Part No. EG 113 10 100

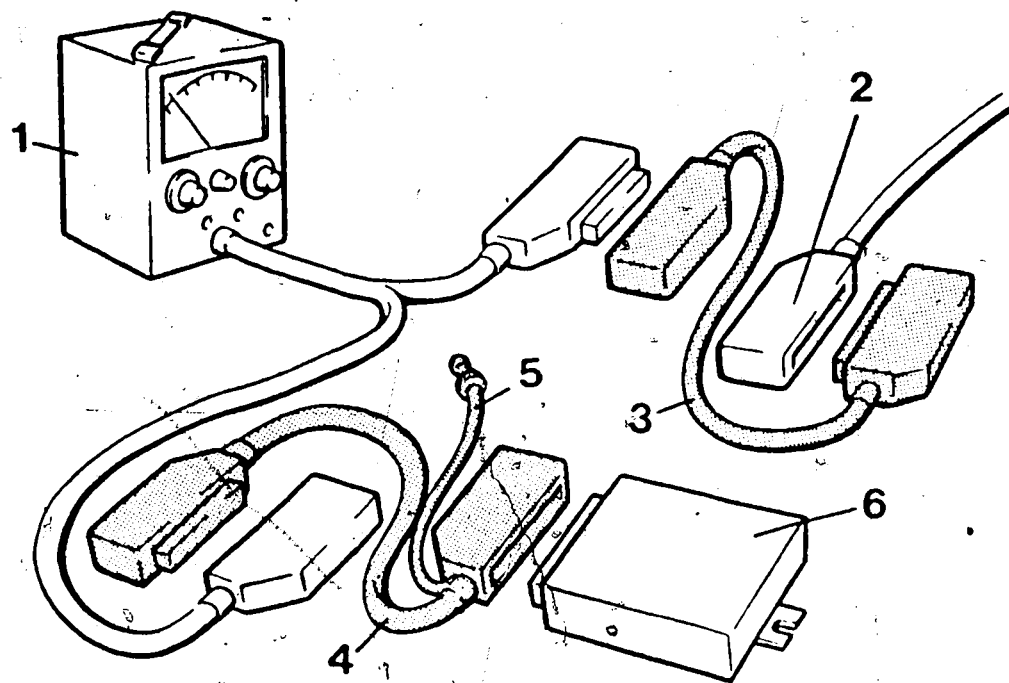
For connecting the vehicle wiring harness to the L-Jetronic tester (analog) ETJ 002.02.

Adapter lead 2, Part No. EG 113 50 100

For connecting the L-Jetronic control unit to the L-Jetronic tester (analog) ETJ 002.02.

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1 = L-Jetronic tester (analog)
ETJ 002.02

2 = Vehicle wiring harness connector
(blue).

3 = Adapter lead 1
(Part No. EG 113 10 100)

4 = Adapter lead 2
(Part No. EG 113 50 100)

5 = Lambda function test lead (only
for USA and Japan vehicles)

6 = L-Jetronic control unit

The two adapter leads can be ordered and obtained from the Datsun/Nissan authorized dealers.

In case of inquiries, please contact your local representative.

FERRARI 400i GT and 400i AUTOMATIC
with K-Jetronic

VDT-I-FER 001 En
4.1979

Starting with the 1979 model Ferrari will be delivering types 400i GT and 400i automatic with 12 cyl. V engine equipped with K-Jetronic.

Engine swept volume	4.8 l
Output	162 kW (220 HP)
Idle speed	900...1100 min ⁻¹

Equipment

The components used for K-Jetronic are already familiar as regards their operation and construction from other K-Jetronic systems. The difference here is that 2 complete 6 cyl. K-Jetronic systems are used with this 12 cyl. engine. However, there is only one thermo-time switch fitted for controlling both start valves.

The fuel-inlet tubes of the two warm-up regulators are connected together because of the necessary control-pressure compensation.

With every warm start the start valves are controlled by a pulse generator and inject fuel intermittently into the two intake manifolds.

When the thermo-time switch is operating the pulse generator is put out of action and the start valves inject continually.

Repair work

The air-flow sensors can be repaired with existing tools in accordance with the repair instructions.

On the fuel distributors only the primary-pressure regulators can be repaired. The repair manual for the basic design can also be used for K-Jetronic systems in this vehicle.

Tools

Apart from the familiar KD tools for K-Jetronic there is also the tester for delivered fuel quantity comparison KDJE 7451 and the valve tester KDJE 7452.

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Technical documentation

Equipment:

Offer sheet for:

KD tools:

Repair manual:

Basic design:

Vehicle related:

Test values:

Repair instructions for
air-flow sensor:

on microfiche

KD-EP 12 En, 13 En, 14 En

VDT-W-438/500 En

VDT-W-438/526 En

VDT-W-438/1023 En

VDT-W-438/100 En

FERRARI 308 GTB...

With K-Jetronic

VDT-I-FER 002 En

2.1980

Since the beginning of 1980 Ferrari have been delivering type 308 GTB with a K-Jetronic equipped 8-cylinder in-line engine. The 3.0 l engine has an output of 147 kW (200 HP).

Equipment

The K-Jetronic components used will be familiar from other K-Jetronic systems.

Repair work

The air-flow sensor can be repaired with the existing tools according to the Instructions VDT-W-438/100 En. With the fuel distributor repairs are only possible to the primary-pressure regulator with combined push-up valve.

Tools

Apart from the already familiar tools for the K-Jetronic there is the tester for delivered-quantity-comparison KDJE-P 200 (formerly KDJE 7451), the valve tester KDJE-P 400 (formerly KDJE 7452) and the component test stand KDJE-P 500 (formerly KDJE 7454). For testing the dismantled components in connection with the above-mentioned KD tools, white spirit with part no. 5 973 340 650 in 5 l cans has been included in the program. The mobile stand KDJE-W 100 is available for work on the vehicle.

Technical documentation

Equipment	: on microfiche
Offer sheet for KD tools	: KD-EP 13 D to 18 D
Repair instructions	
Basic instructions	: VDT-W-438/500 En
vehicle related	: in preparation
mixture-control unit	: VDT-W-438/100 En
test values	: in preparation

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Fiat 131 and 132 Diesel

with VE..F..

distributor-type fuel-injection pump

VDT-I-FIA 014 En

12.1981

(Supersedes 5.81 Edition)

BOSCH

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This publication has been redesigned with the forthcoming change-over to microfilm in mind. When a publication has been transferred to microfilm, the screen will be filled completely by a quarter of a printed publication page. For this reason, it is unavoidable that illustrations are repeated in the case of longer texts in which reference is constantly being made to a particular illustration. Until the change-over to microfilm, we have slightly reduced the size of the print and of the illustrations.

Contents:

Page	
3	1. Tools
3	2. Removing the fuel-injection pump
3	3. Installing the fuel-injection pump and injection timing
5	4. Bleeding the fuel-injection system
6	5. Adjusting the tension of the toothed belt
6	6. Checking the engine timing
6	7. Tightening torques

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Department for Technical Publications KH/VDT, Postfach
50, D-7000 Stuttgart 1

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1. Tools

Setting mandrel

KDEP 1112

For checking the engine timing

*Short-arm swivel wrench

Hazet Co.,
Postfach
101067/68
5630 Remscheid
1
Part No. 2742

For fastening the fuel-injection pump with the vacuum pump installed

Measuring tool

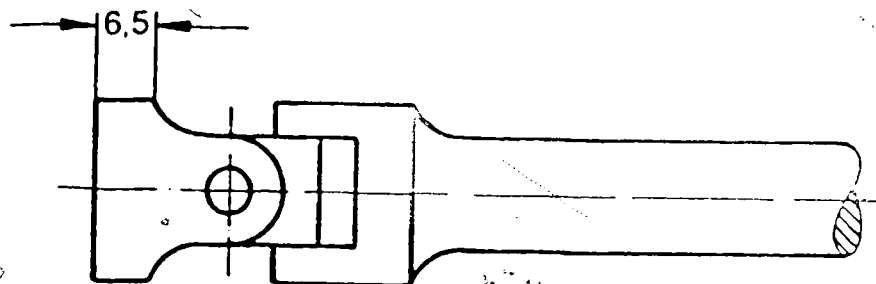
KDEP 1085

Injection timing

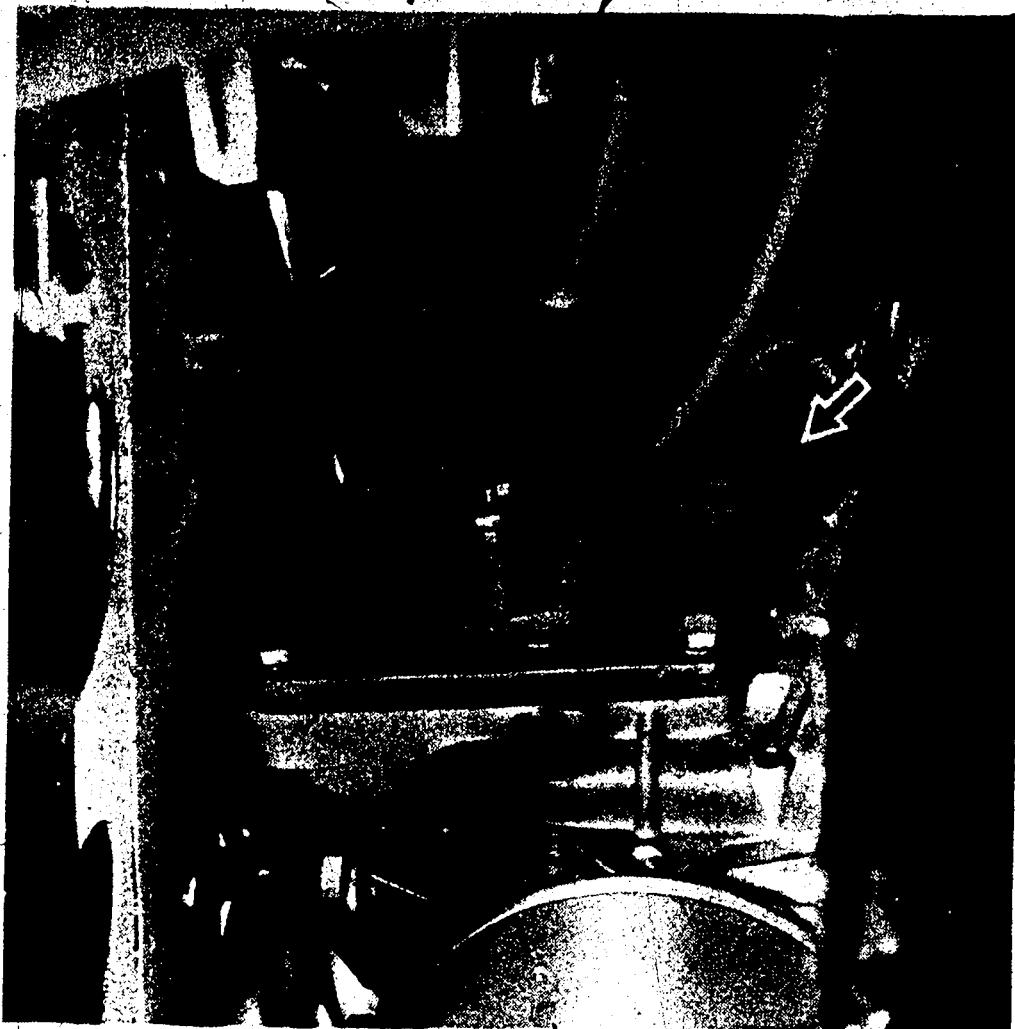
- Dial indicator commercially available
1/100 mm graduations

Injection timing

*The socket section of the short-arm swivel wrench must be turned to size according to the following sketch:



For machining, screw off the socket section and use a carbide cutting tool.

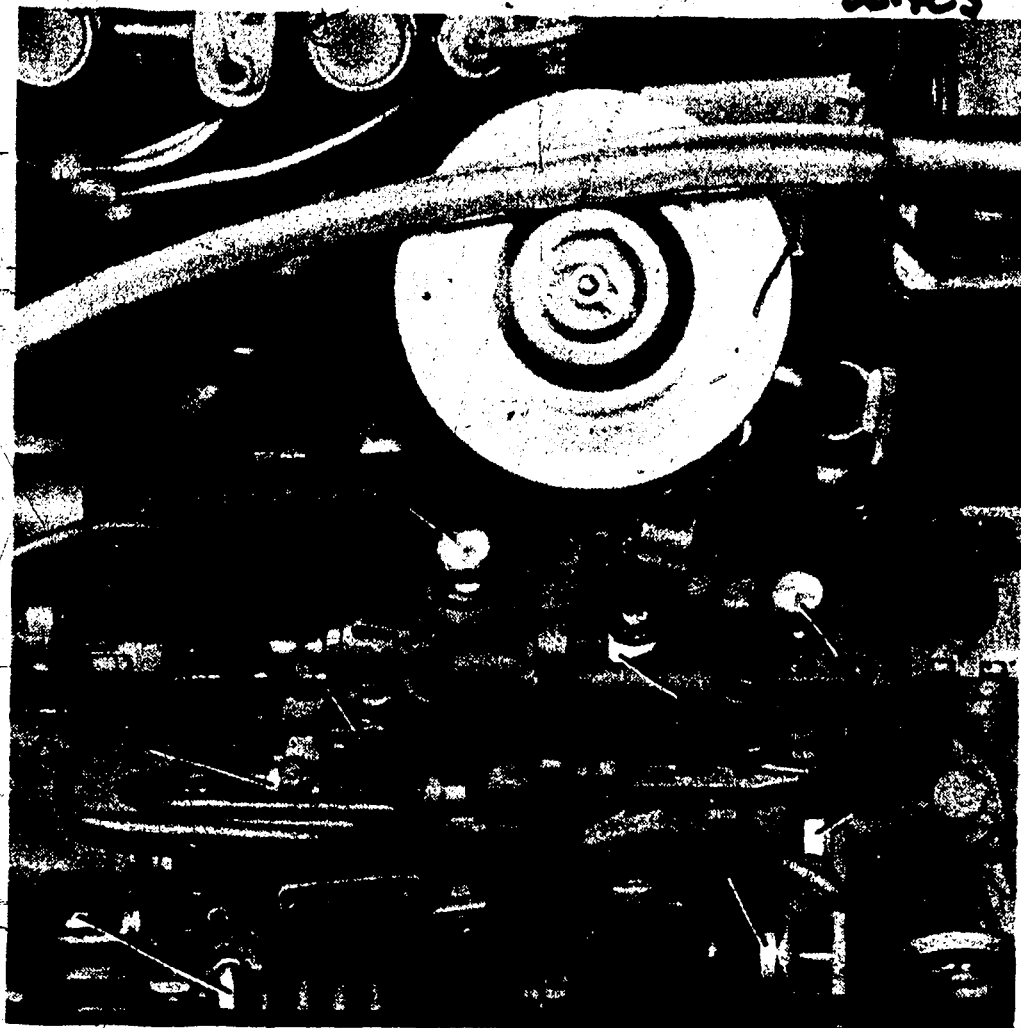


2. Removing the fuel-injection pump

Disconnect the negative cable (-) from the battery.

Loosen screw (5) (see Fig. 2) for oil dipstick holder and remove oil dipstick holder.

Raise the vehicle by means of a lifting platform and, from underneath the vehicle, loosen the lower fastening nut (Fig. 1) of the injection pump using the short-arm swivel wrench (see Section 1: Tools) and take off by hand.



Remove Bowden cable from control lever (1) of injection pump.

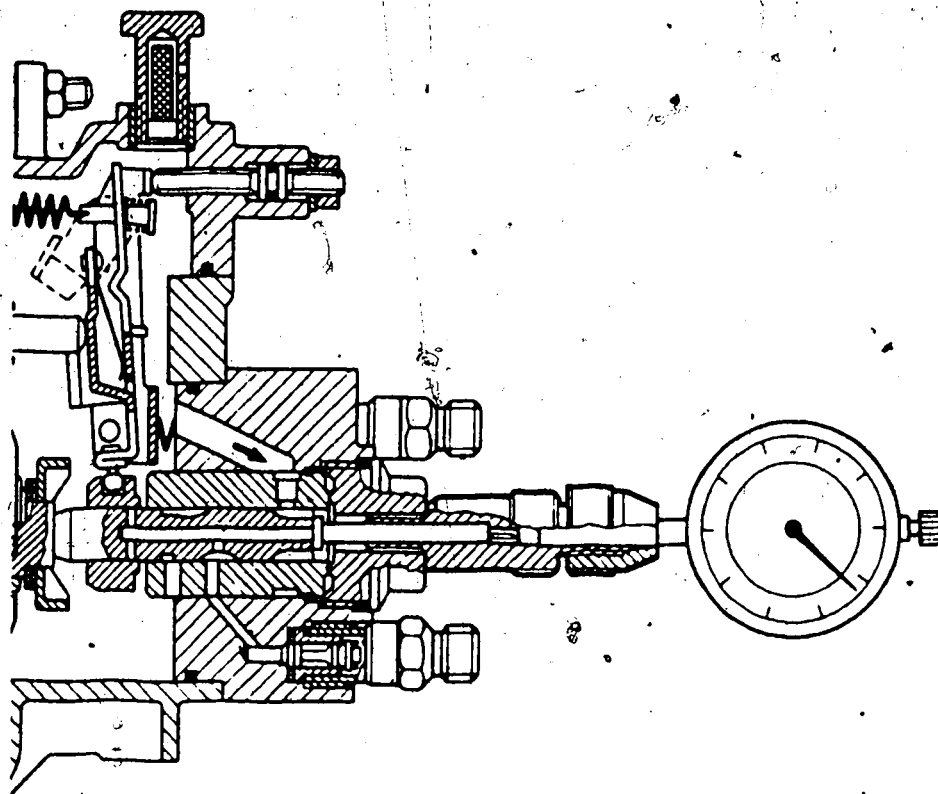
If fitted: Remove Bowden cable from KSB (cold-start accelerator).

Screw off fuel inlet and return lines (2) (3) on injection pump.

Remove electric lead from solenoid-operated valve (4).

Take off hood of injection nozzles. Remove leakage-fuel return line (6) from injection nozzles. Remove fuel-injection tubing (7). Remove fastening nuts (8) with plain washers.

Take off holder for "Accelerator-cable sleeve" from fuel-injection pump.



3. Installing the fuel-injection pump and injection timing

Fit the holding bracket for the accelerator-cable sleeve.

Remove the bleeder screw from the distributor-type-fuel-injection pump.

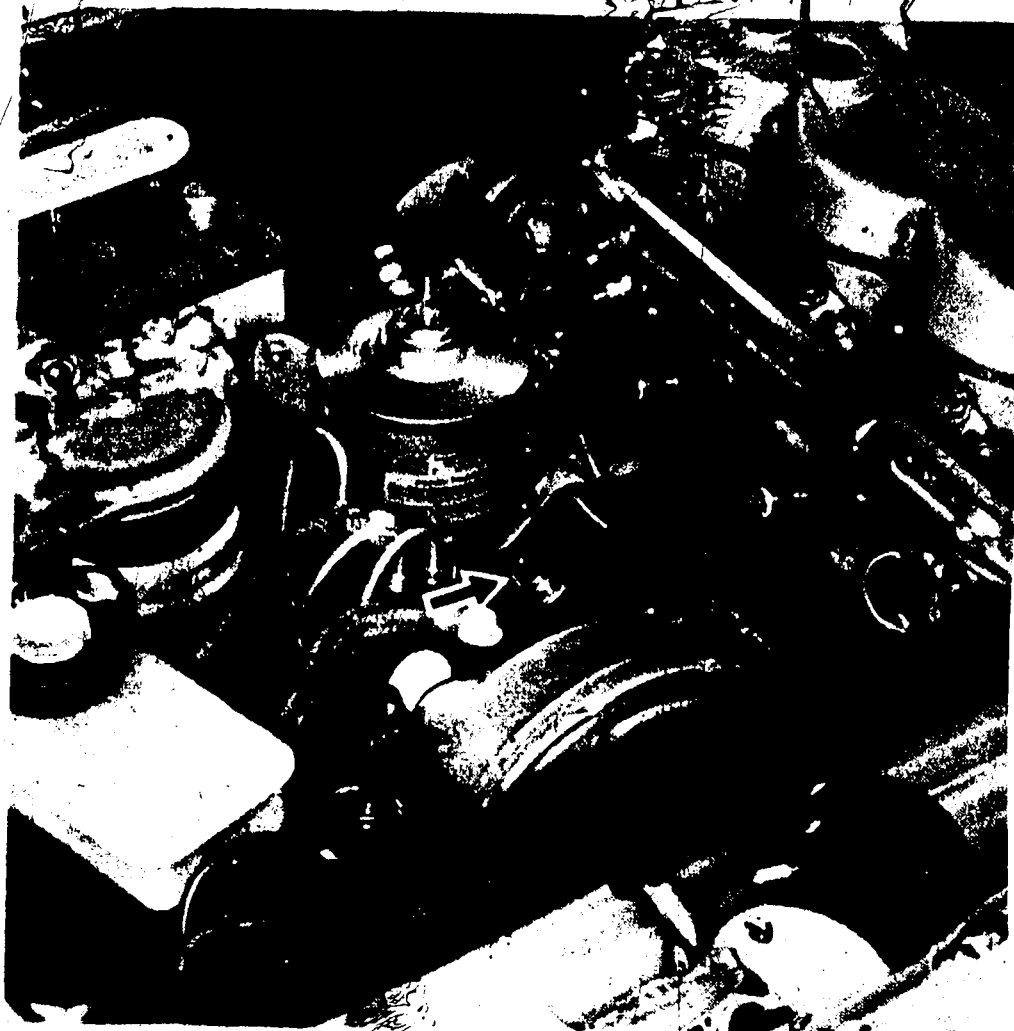
Screw measuring tool KDEP 1085 into the central screw plug on the injection pump.

Fit dial indicator in measuring tool with measuring base and approx. 1 mm preload.

Fuel-injection pumps with KSB: KSB lever must be in "0-position".

Turn injection pump drive shaft so that the distributor-pump plunger is in BDC position (smallest reading on dial indicator).

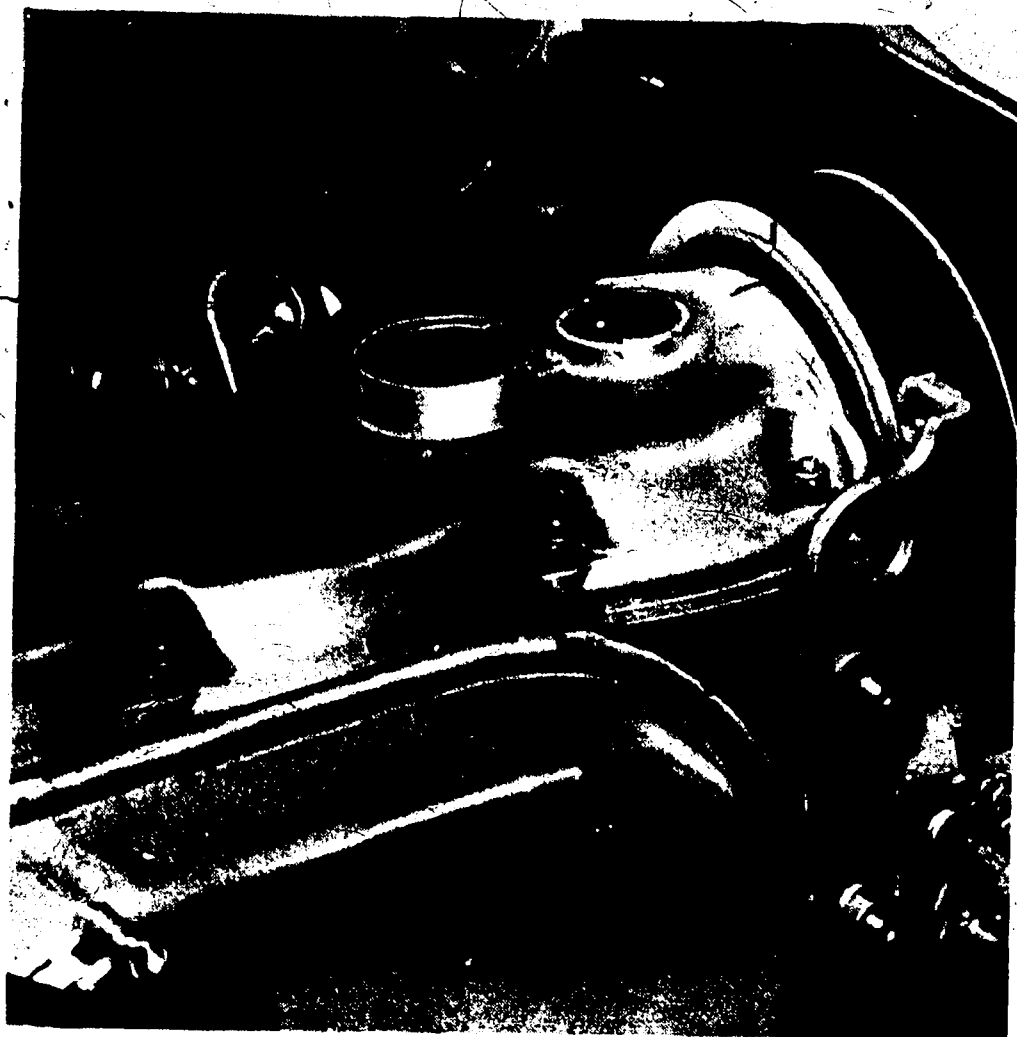
328



In this position, set the dial indicator with approx. 0.5 mm preload to "0".

Remove the cyclone separator (liquids/oil vapours).

Introduce the injection pump so that the markings on the pump pinion and pump drive gear ("Lost tooth") are in alignment.

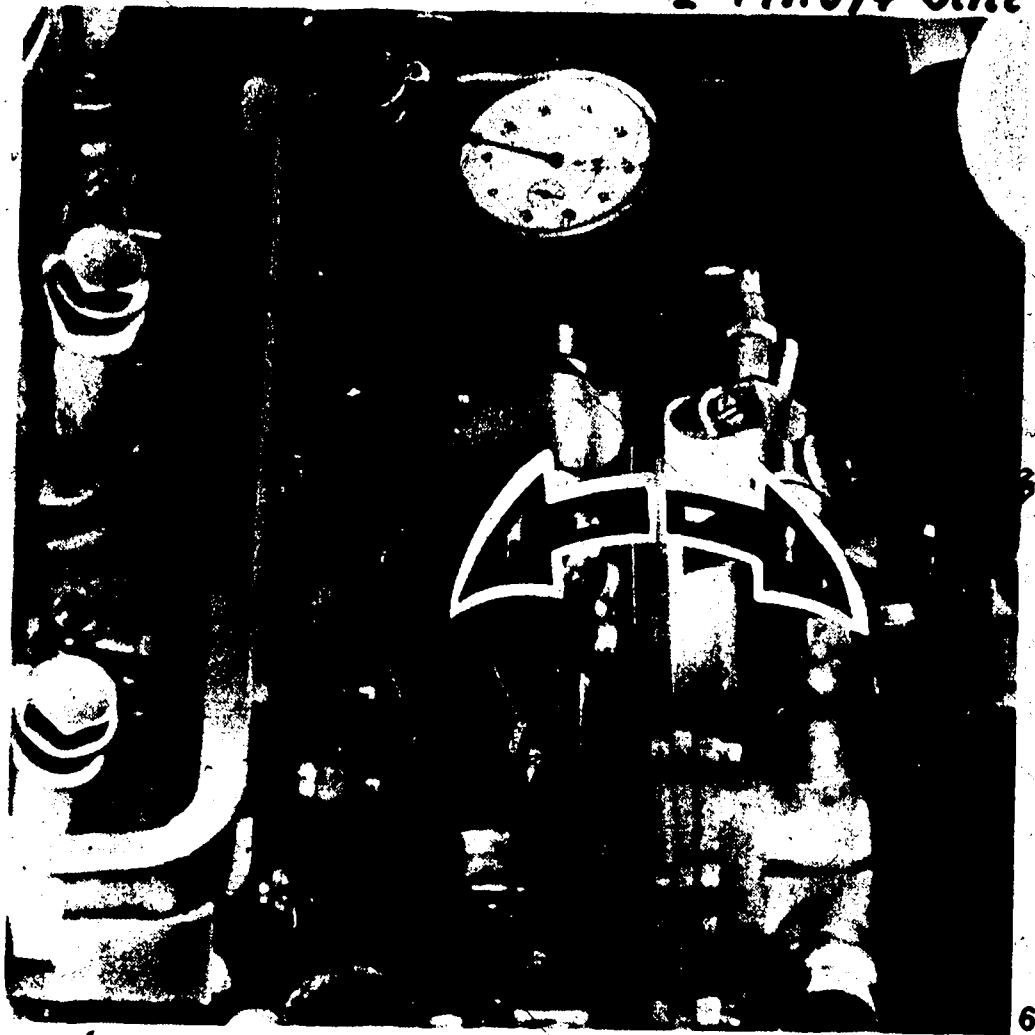


5

If necessary, turn the crankshaft against the direction of rotation of the engine so that the marking on the camshaft gear is approx. 10mm in front of the marking on the cylinder head cover (Fig. 5).

Screw on plain washers and hexagon nuts for fastening the pump (only upper fastening screws) but do not tighten.

Turn crankshaft in direction of rotation of engine until the markings on the camshaft gear and cylinder head cover are in alignment.



6

3.1 Injection timing

Check the engine timing in accordance with Section 6.

Pivot the injection pump in a clockwise direction until the dial indicator indicates a distributor-pump plunger stroke of 1 mm from BDC.

Screw down the injection pump in this position by means of the upper fastening nuts.

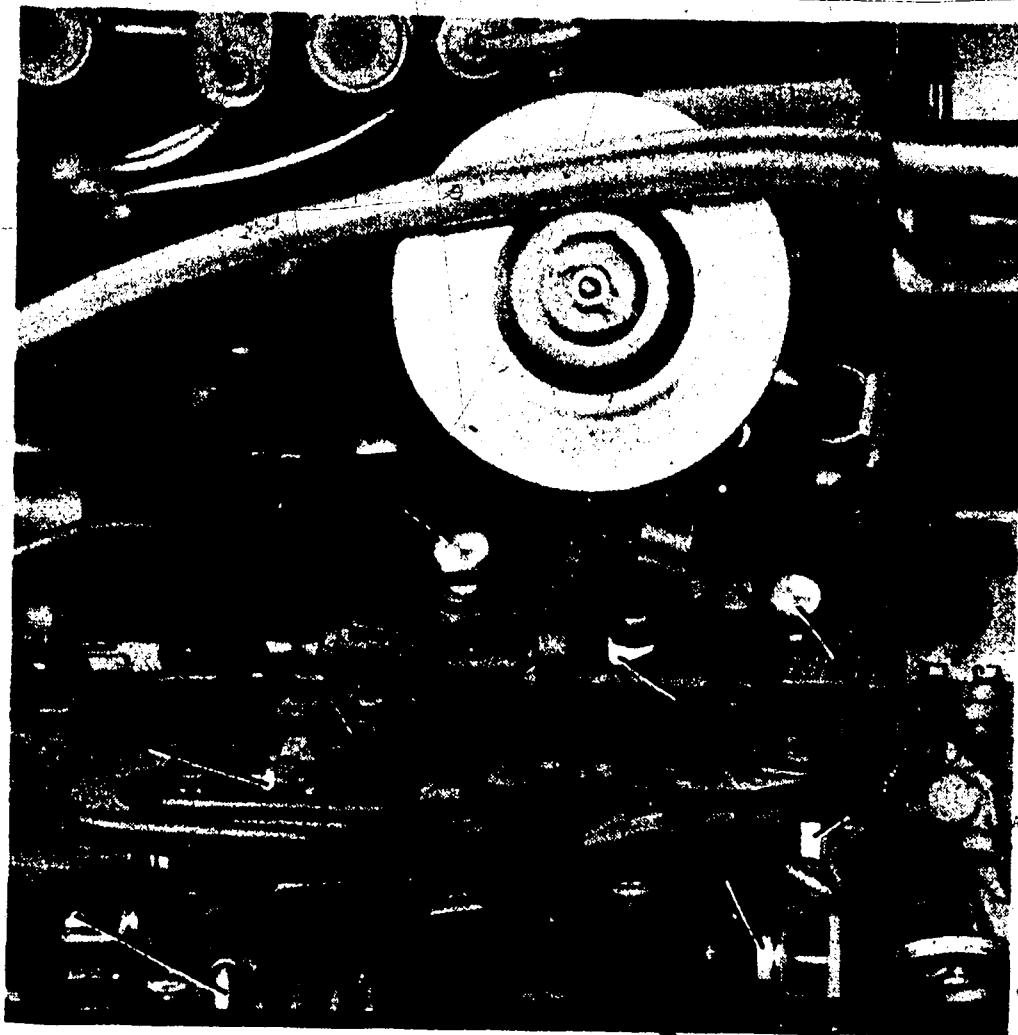
Check the position of the injection pump by turning the camshaft.

Remove measuring tool KDEP 1085 with dial indicator from the injection pump.

Screw bleeder screw with new seal ring into central screw plug and tighten to 8 ... 10 Nm (0.8 ... 1.0 kgfm)

Raise vehicle by means of lifting platform.

Screw on lower fastening nut of injection pump by hand (from underneath vehicle) and tighten with short-arm swivel wrench (see Section 1: Tools).



3.2 Installing the individual parts

Screw the fuel-injection tubing (7) onto the injection pump and injection nozzles.

Tighten the union nuts to 25 Nm (2.5 kgfm).

Fit the leakage-fuel return line (6) on the injection nozzles.

Screw down the fastening screw (5) for the oil dipstick holder.

Connect the electric lead for the solenoid-operated valve (4).

During the following operation make sure that the inlet-union screws for the fuel inlet and return lines are not mixed up. Distinguishing feature: Inlet-union screw (throttle screw) for return has a small restriction bore on the circumference.



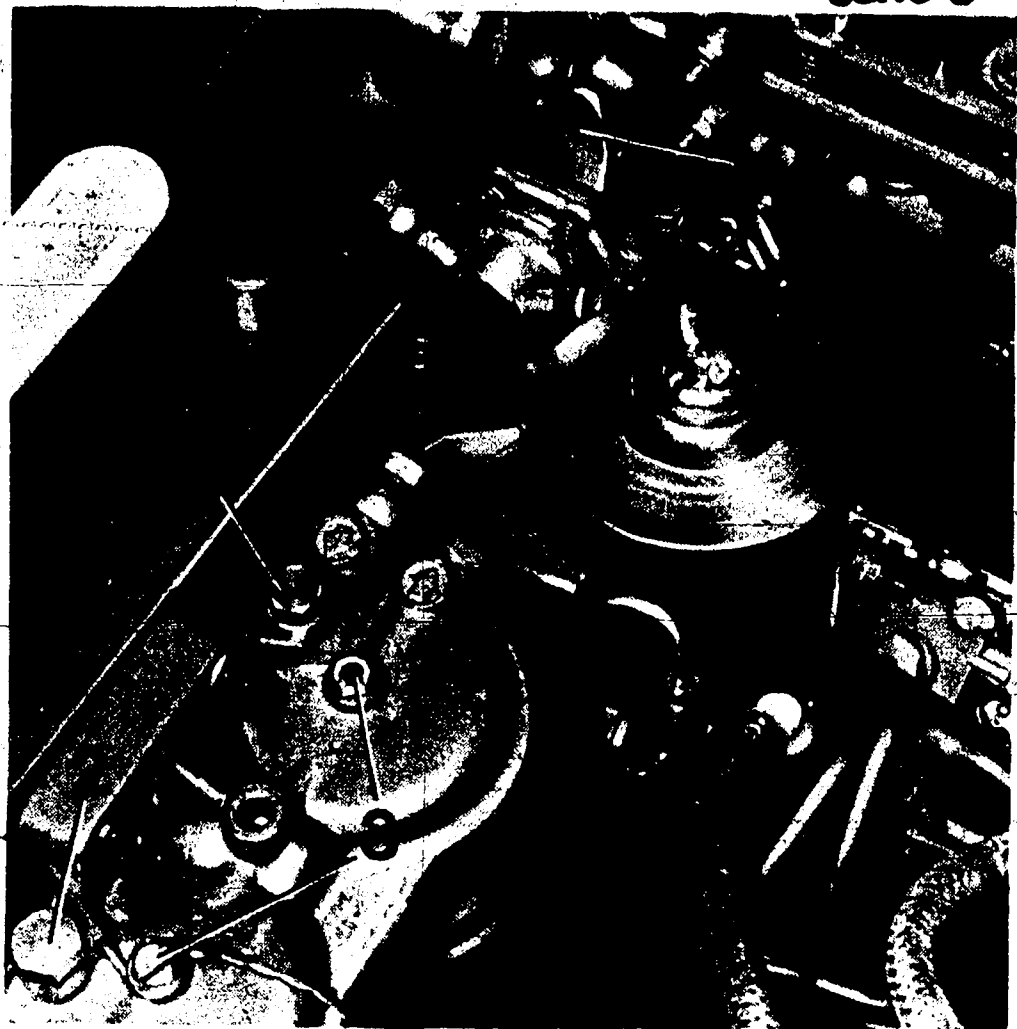
Connect the fuel inlet and return lines (2) and (3) to the injection pump.

Fit the Bowden cable from the accelerator to the control lever (1).

If fitted: Hook the Bowden cable of the KSB into the operating lever on the injection pump. Fit the hoods of the injection nozzles.

Connect the negative cable (-) to the battery.

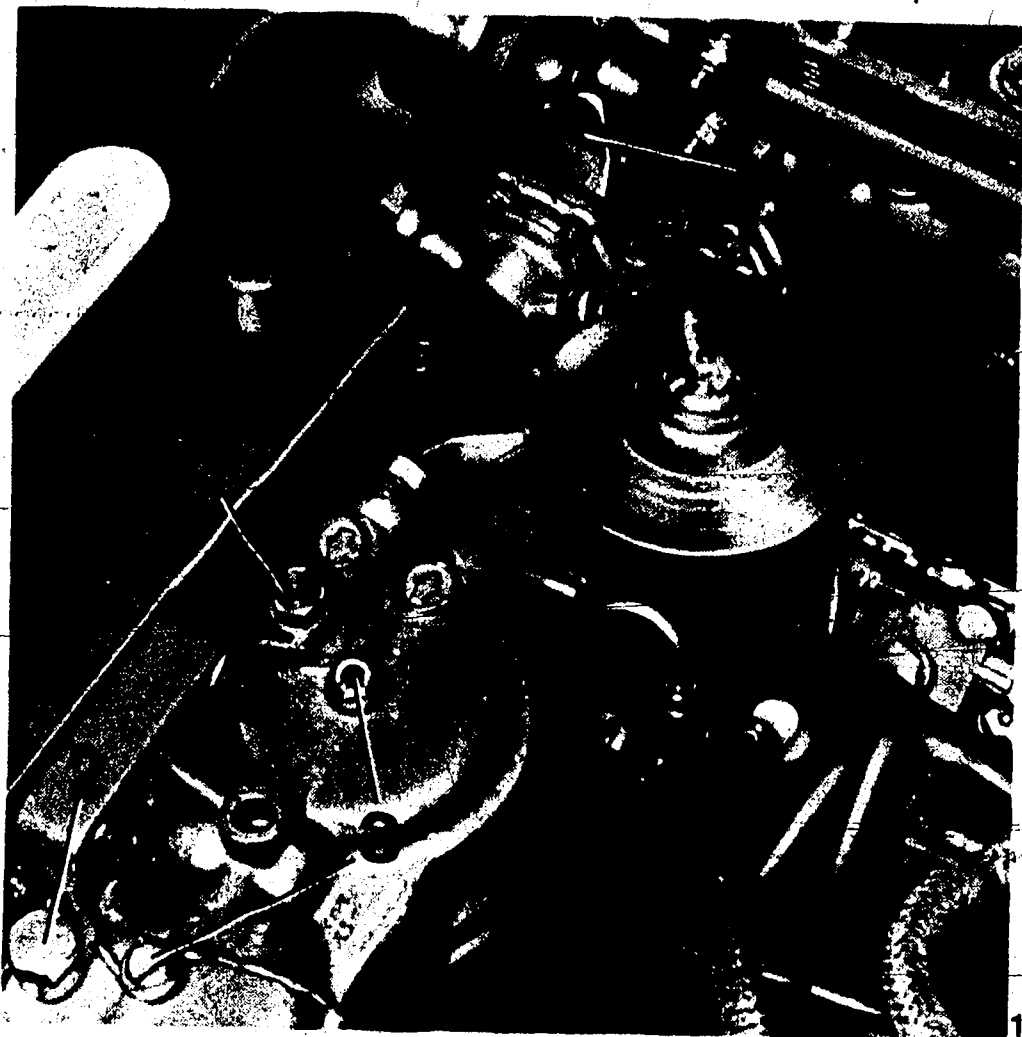
Bleed the fuel-injection system in accordance with Section 4.



4. Bleeding the fuel-injection system

Loosen the bleeder screw (1).
Operate the hand primer (4) until the fuel escaping at the bleeder screw is free of bubbles. Re-tighten the bleeder screw (1).

Loosen the bleeder screw (2).
Operate the hand primer (4) until the fuel escaping at the bleeder screw is free of bubbles.
Re-tighten the bleeder screw (6).



4.1 Changing the filter elements

Loosen the hexagon screws (3).

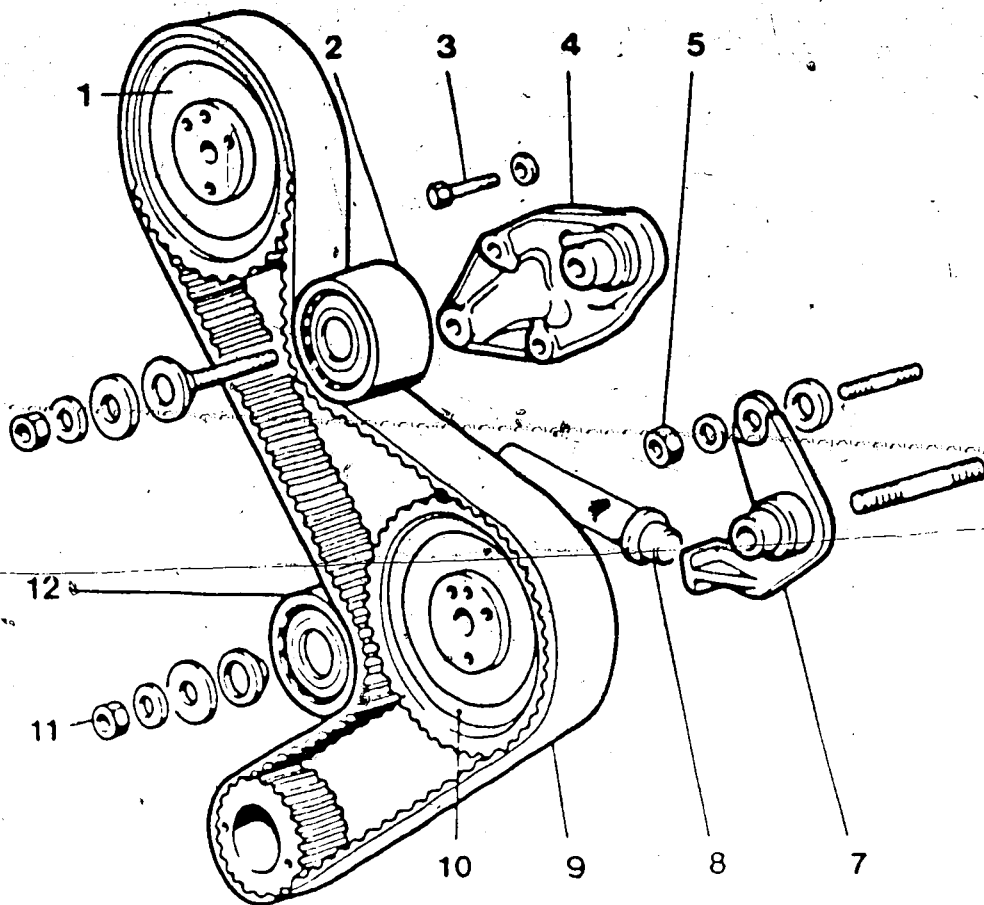
Remove filter elements together with tubular carrier.

Before fitting new filter elements, clean the tubular carrier with gasoline.

After fitting new filter elements, bleed the fuel-injection system. (See Section 4).

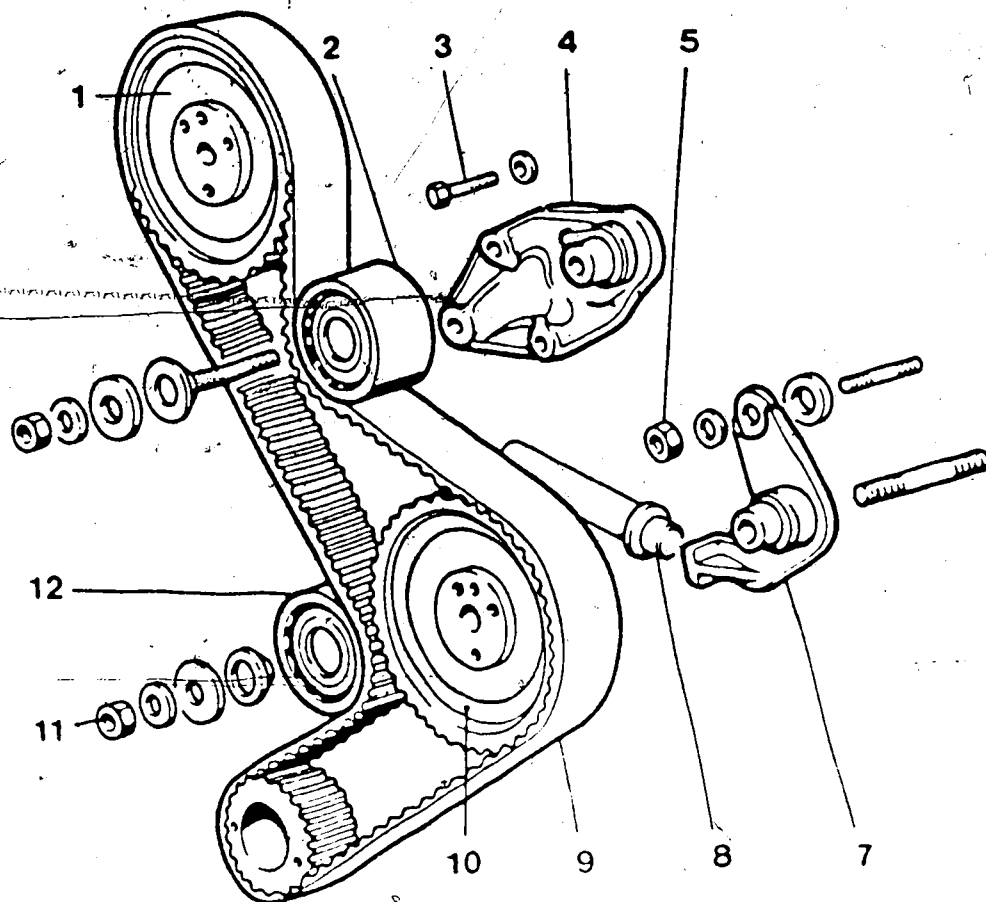
Draining the water separator:

After loosening the drain plug (on the base of the filter) the water separator can be drained.



5. Adjusting the tension of the toothed belt

1. Camshaft gear
2. Upper tensioning roller
3. Fastening screw for Item 4
4. Tensioner holder
5. Fastening nut for Item 6
6. Holder for Item 12
7. Spring tensioner
8. Toothed belt
9. Auxiliary-drive-shaft gear
10. Drive gear on crankshaft
11. Fastening nut for Item 12
12. Lower tensioning roller - adjustable



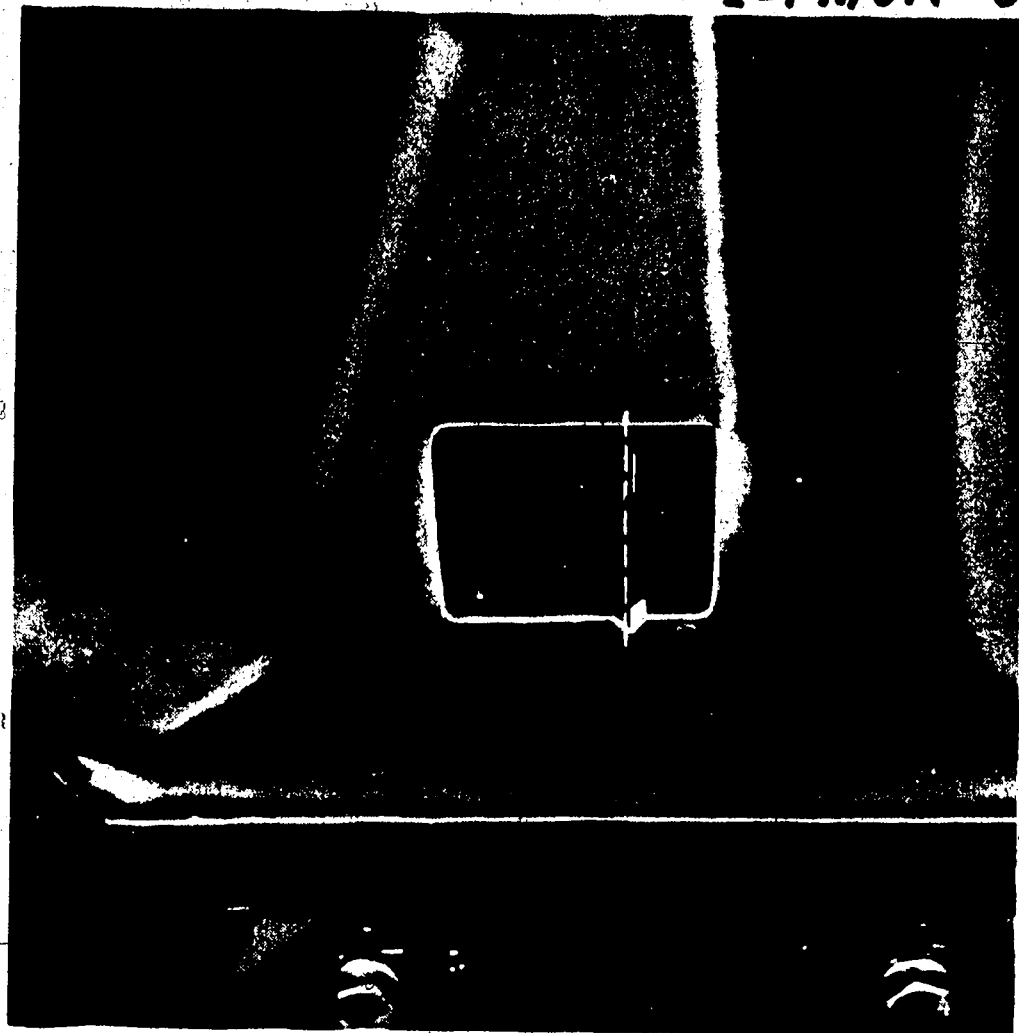
Slacken the hexagon nut (11) for the lower tensioning roller.

The spring-loaded tensioning roller can now act against the toothed belt.

Tighten the lock nut (11).

Turn over the crankshaft 1 - 2 revolutions in the direction of rotation of the engine.

Slacken the hexagon nut (11) and tighten again.



13

6. Checking the engine timing

Take off the hood of the injection nozzles. Remove protective cover of toothed belt.

Bring piston of cyl. 1 (engine) into TDC position. Cylinder 4 is on overlap.

In this position, the markings on the flywheel and clutch housing must be in alignment.

Check the alignment of the markings on the camshaft drive gear and cylinder head cover.

Check the position of the auxiliary-drive-shaft gear (Item 9 Fig. 11) and of the crankshaft gear (Item 10, Fig. 11) using the setting mandrel KDEP 112.

Remove the setting mandrel.

7. Tightening torques

Injection pump fastening nuts	25 Nm (2.5 kgfm)
Injection pump bleeder screw	9 Nm (0.9 kgfm)
Pump drive pinion fastening nut	65 Nm (6.5 kgfm)
Fuel-injection tubing	25 Nm (2.5 kgfm)
Fuel lines	25 Nm (2.5 kgfm)
Screw for injection nozzle bracket	49 Nm (4.9 kgfm)
Nut for belt tensioner M 10 x 1.25	45 Nm (4.5 kgfm)
Nut for belt tensioner holder M 8	25 Nm (2.5 kgfm)
Sheathed-element glow plugs	15 Nm (1.5 kgfm)

FIAT RITMO DIESEL

with VE 4/9 F 2300 R 54

0 460 494 044

Optimization of warm-up phase

VDT-I-FIA 022 En

2.1983

(Supersedes 6.1982 edition)

In order to improve the warm-up phase, FIAT has released a modified timing-device cover for vehicles with heavy blue smoke generation.

This timing-device cover KDEP 1129 can be ordered from KH/VKD4. Unit price DM 3.50. Minimum order 10 units.

Conversion is subject to payment in all cases.

In case of conversion, remove the distributor-type pump and proceed as follows:

1. Replace the pressure-side timing-device cover with a special cover KDEP 1129.
2. Set the injection timing.
Injection pump: $1.25\text{mm} \pm 0.05\text{ mm}$ after BDC
Engine: TDC mark cyl. 1 on flywheel
3. Mark the pump with a "1" after the part number.
4. The testing and setting of the pump on the test bench do not change.

The modified timing-device cover KDEP 1129 can be obtained immediately within Germany from

Robert BOSCH GmbH

Abt. KH/VKD4

Auf der Breit 4

Postfach 41 09 60

7500 Karlsruhe 41

Telex 7 826 663

and outside Germany from RG/AV.

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Ford Capri RS 2600

with mechanical gasoline injection

VDT-I-FOR 004 B

September 1978

Up until the start of 1974 Ford fitted the engine of their Capri 2600 with mechanical gasoline injection. This was a V-6 engine with a "V" of 60°. Swept volume 2.6 l, 110 kW (150 HP) at a rotational speed of 5800 min⁻¹ (rev/min). The basic adjustment of the ignition point is at 6° ± 1° before TDC. Idle speed 1000 ... 1100 min⁻¹.

1. Injection equipment

These gasoline injection pumps are known by the term "Kugelfischer", having been made by the former "Schäfer Einspritztechnik" company.

up to about 4.72

Injection pump	PL 06-116.01 B 1	8 492 006 301
Injection valve	DL 0-20 D	8 492 801 227
Valve insert (supporting device)		8 492 809 031
Opening pressure	30 + 8 bar gauge pressure	

as from about 5.72

Injection pump	PL 06-116.01 C 1	8 492 006 302
Injection valve	DL 0-30 A	8 492 801 300
Opening pressure	30 + 8 bar gauge pressure	
Fuel pump		0 580 364 002

2. Explanation of the type designation

See Service Information VDT-I-BMW 008

3. Description of the injection system

See Service Information VDT-I-BMW 008

The following component differs from this:

Injection valve

The injection valve DL 0-20 D - 8 492 801 227 has been replaced by the hook valve DL 0-30 A - 8 492 801 300. The designation "hook valve" is a reference only to the valve's outer shape. The hook valve is not screwed, but pushed into the intake passage. Fastening and angular orientation are achieved by means of a flange mounted on the valve holder. An O-ring on the valve holder assures sealing off to the outside.

4. Removing the injection pump

Here and in the following sections only deviations from, or remarks on, general working steps are mentioned.

Drain off half the coolant. Loosen the hose clips and remove both water hoses and the vacuum hose to the warm-up sensor. Pull off the injection pump driving wheel. Remove the two screws securing the pump on the swivel-bearing plate. Screw the rear swivel-bearing plate off the engine block and pull the pump out from the opening in the front pump support. Remove the rear swivel-bearing plate from the pump.

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5. Installing the injection pump

Set the engine to Ignition TDC of cylinder 5. The ignition-distributor rotor must point to ignition at cylinder 5. The keyway in the pump camshaft points to the center of the pump housing; this corresponds to port opening of pump cylinder 1. The 1st pump cylinder is on the drive side. The punch mark on the pulley points vertically upwards. Install the injection pump by reversing the sequence given for removing it. Connect the fuel-injection lines as follows:

Injection sequence — Pump	1 5 3 6 2 4
(plunger-and-barrel assy. no.)	+++++
Ignition sequence V-6 engine	1 4 2 5 3 6
(cylinder no.)	

Seen in the direction of travel cylinders 1-2-3 are on the right-hand side starting at the front, and cylinders 4-5-6 are on the left starting at the front.

Fill the pump with 150 cm³ of engine oil.

6. After-sales service notes

Injection pump

Until about April 1971 injection pump PL 06-116.0 A 1 — 8 492 006 300 was fitted. This model had no speed-dependent governing. The 3-D cam was replaced by a revolving element. Model A 1 is completely interchangeable with model B 1, part no. 8 492 006 301. A 1 should no longer be used. The completely different governor shaft is all that differentiates between models B 1 and C 1 (part no. 8 492 006 302).

Injection valves

The opening pressure of the injection valves is 30 – 8 bar gauge pressure. The minimum permissible opening pressure is 15 bar gauge pressure. At a pressure of 15 bar no droplet may form after 5 seconds. The injection valve must be rinsed through, by quickly operating the nozzle tester, before each test. The opening pressure cannot be adjusted.

Adjusting the warm-up sensor on the vehicle

With the engine cold, pull the air spool out of the warm-up sensor housing. With model B 1, which has a hexagon nut on the air spool, push the air spool in at

the ring groove with tool KDEP 2759. In the case of the C 1 model, with a round nut on the air spool, push the air spool into the ring groove with a gauge (7.5 mm) which may have to be user-fabricated. Try an open-ended wrench. In this position the enrichment screw must rest against the stop screw and the collar nut must touch the enrichment lever.

Adjusting the connection between pump and throttle valve

Set the 5th engine cylinder to Ignition TDC. The ignition-distributor rotor must point to ignition at cylinder 5. Unhook the throttle valve restoring spring. Remove the connecting hose between the throttle-valve housing and the air filter. Loosen the throttle-valve stop screw (idle adjustment). Close the throttle-valve as far as possible and hold it tight in this position. With a cylindrical pin of 5 mm dia. (if necessary to be user-fabricated as shown in fig. 1) align the hole in the throttle-valve actuating lever with the hole in the throttle-valve housing. Loosen the upper locking screw in the linkage lever. Completely shut the throttle valve and re-tighten the locking screw. Unlatch the connecting rod between the pump and the throttle valve at the throttle shaft. Align the hole in the pump control lever with the hole in the pump housing by using an adjustment hook of 5 mm dia. (if necessary to be user-fabricated as shown in fig. 2). With the throttle valve still closed, adjust the length of the connecting rod by rotating the ball sockets on the ball studs. Tighten up the lock nuts at the connecting rod and refit the connecting rod. Remove the two cylindrical pins and open the throttle valve until the stop in the interior of the pump is reached. Screw in the full-load stop screw up to the stop on the throttle-valve housing, then turn through one more full turn and lock. The throttle valve restoring spring can then be hooked into the hole in the throttle-valve linkage again.

Adjusting the idle speed

Open the throttle valve and turn it back just far enough for a 0.15 mm feeler gauge to be pushed between the throttle-valve flange and the lower part of the throttle-valve. Re-fit the connecting hose from the throttle-valve housing to the air filter. Screw the air-regulating screw on the throttle-valve flange right in, and then turn it back out through 2 1/2 turns. This gives an idle speed between 1100 and 1200 min⁻¹. A minor correction to the air-regulating screw or to the idle-adjustment screw may still be necessary to achieve even idling.

It can occur that the idle speed starts to fluctuate, i.e. it increases or decreases slightly. If the linkage, idle-mixture regulating screw and idle-adjustment screw are all correctly adjusted and the engine continues to run evenly without vibrating unduly when the specified idle speed is slightly exceeded, then the variations in idle speed can be ignored. No further adjustments should be undertaken to try and eliminate them.

Cold-starting

The injection system dictates that the starting process be completely different to that experienced with a carburetor engine. Please observe the following points during cold starting: Turn the ignition key in the steering/ignition lock to the right, to position "II". The oil-pressure-warning lamp and generator charging lamp will illuminate. Do not touch the accelerator pedal. Allow the fuel pump to run for about 10 seconds. By turning the ignition key further to position "III" the starting motor is actuated. After the engine has turned over and started, release the key. If the engine starts but dies, repeat the starting process. Do not touch the accelerator pedal even if this process has to be repeated several times. Only when the engine has started and run for about 30 seconds can it be accelerated using the accelerator pedal. This starting procedure ensures that the engine does not die and that ignition problems are not created by excessive fuel.

Setting the CO content

This can only be carried out with the engine at operating temperature. Set the prescribed idle speed using the idle stop screw of the actuating lever. Remove the plug on the top of the throttle valve housing and set the CO content at 4% by adjusting the throttle-valve adjustment screw through the opening with a 2 mm hexagon-socket screw key. Only read off the CO content when the idle speed has been re-set. After the adjustments accelerate briefly once or twice and check the CO content.

Fuel consumption too high in city driving

The average fuel consumption for this vehicle in city traffic is about 12–14 mpg. If the vehicle falls well short of this figure, the throttle adjustment and ignition system must be checked. The high fuel consumption can also be caused by a cold-start valve which injects continuously when the ignition is switched on. A check must also be made to ensure that the warm-up sensor no longer signals "enriched injection" after the engine has reached normal operating temperature.

Checking the cold-start valve

In the case of cold-starting difficulties (coolant temperature below + 35° C) the following should be checked:

Remove the cold-start valve, but leave it connected. Switch on the ignition. The valve must not squirt any fuel. Operate the starting motor (remove lead 1 to the ignition coil). The cold-start valve must squirt until the starting motor is switched off again.

7. Repair

As a matter of principle the injection pump should not be completely dismantled without adequate knowledge or without the repair instructions and special tools required. One can at most remove the pump housing in order to visually inspect the interior of the pump and clean it if necessary.

8. Testing

A normal Bosch injection-pump test bench can be used for testing the injection pump. The normal calibrating oil can be used too, but please be sure to use only genuinely clean calibrating oil.

Testing the operation of the governor

Testing speeds: 500, 1400 and 2800 min⁻¹.
Tolerances: at a speed of 500 min⁻¹ none, at 1400 min⁻¹ the tolerance limits are shown by two marks some distance apart on the governor gear wheel and at 2800 min⁻¹ the limits are shown by two marks somewhat closer together.

Hysteresis (governor friction): set to within 1/2 tooth when testing with in- and decreasing rotational speeds at 500 min⁻¹. At speeds of 1400 and 2800 min⁻¹ the hysteresis remains within the tolerances. As a basis for checking, a mark has been made on the left on the governor housing.

Setting the governor

The governor is set whilst mounted on the pump. The pump housing must also be in place.

Drive the test bench at a speed of 500 min⁻¹ and alter the spring pretension by turning the sprung gear wheel, with the locking screw loosened and the governor gear wheel blocked, so that the mark for 500 min⁻¹ aligns with the mark made on the pump housing.

Drive the test bench at a speed of 1400 min⁻¹ and check whether the mark on the housing falls within the tolerance limits for 1400 min⁻¹ on the governor gear wheel. If not, the spring length must be altered accordingly at the clamp. The same process should be followed at 2800 min⁻¹. These reciprocal adjustments should be carried out until all points lie within the tolerance limits.

9. Test specifications

Direction of rotation:
clockwise (to the right) looking onto the drive.
Plunger stroke at idle:
 0.50 ± 0.01 mm, fix regulating lever in idle position
and governor gear wheel to 500 min^{-1} .
Ignition sequence:
1-5-3-6-2-4
Intake pressure:
1.4 ... 1.6 bar gauge pressure

Regulating-lever position	Rotational speed min^{-1}	Strokes	Fuel delivery cm^3	Dispersion cm^3	Hysteresis cm^3
PL 06-116.01 B 1					
Full-load	2800	300	14.1 ... 14.9	0.4	—
Part-load	1400	500	12.9 ... 13.8	0.5	—
Idle	500 *	500	4.3 ... 5.6	0.5	0.5
PL 06-116.01 C 1					
Full-load	2800	300	12.9 ... 14.1	0.4	—
Part-load	1400	500	6.9 ... 8.2	0.5	—
Idle	500 *	500	7.3 ... 8.5	0.5	0.5

* This speed should be tested twice, once approaching from above and once from below.

10. Tools

Various service tools are required for repairing this injection pump and these **must** be ordered in the same way as other service tools using offer sheet KDEP 17 B of 4.76.

Testing tools are developed by Division K 7, Workshop Equipment. If necessary please address an inquiry to K 7/VKF 1. An offer sheet will appear in Summer 1976.

11. Service parts

Service parts lists exist on microfiche. Service parts should be ordered in the customary way.

12. Exchange

Gasoline injection pumps which can be obtained as exchange parts are listed on the corresponding microfiche (exchange products).

13. Warranty

The familiar Bosch warranty periods and procedural regulations, as detailed in the Bosch warranty handbook, are applicable.

Date of manufacture (FD)

The FD is imprinted on the pump housing in the form of a letter and a number from 1 to 12 representing the month.

V = 1972, W = 1973, X = 1974, Y = 1975, Z = 1976
1 to 12 = January to December.

Please re-code these FD's in accordance with the Bosch warranty handbook.

Example W 5 = 1973 May 325 or Z 3 = 1973 March 623

Defect numbers

Until the defect number list appears give defect number 10 and explain the trouble located on a separate sheet in clear text

14. Technical documentation

Repair and testing instructions will appear later. The test specification sheet is included in this service information in provisional form.

Service parts lists exist on microfiche.

Offer sheet for service tools KDEP 17 B 4.76 is available.

Offer sheet for testing tools will appear in Summer 1976.

Exchange products are to be found on microfiche WB-00.

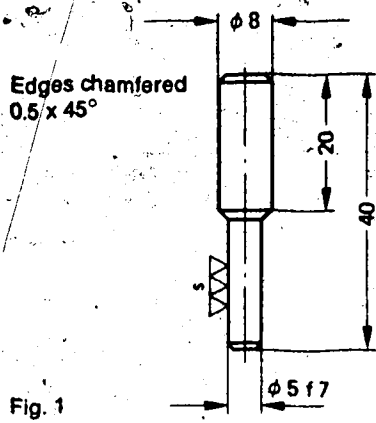


Fig. 1

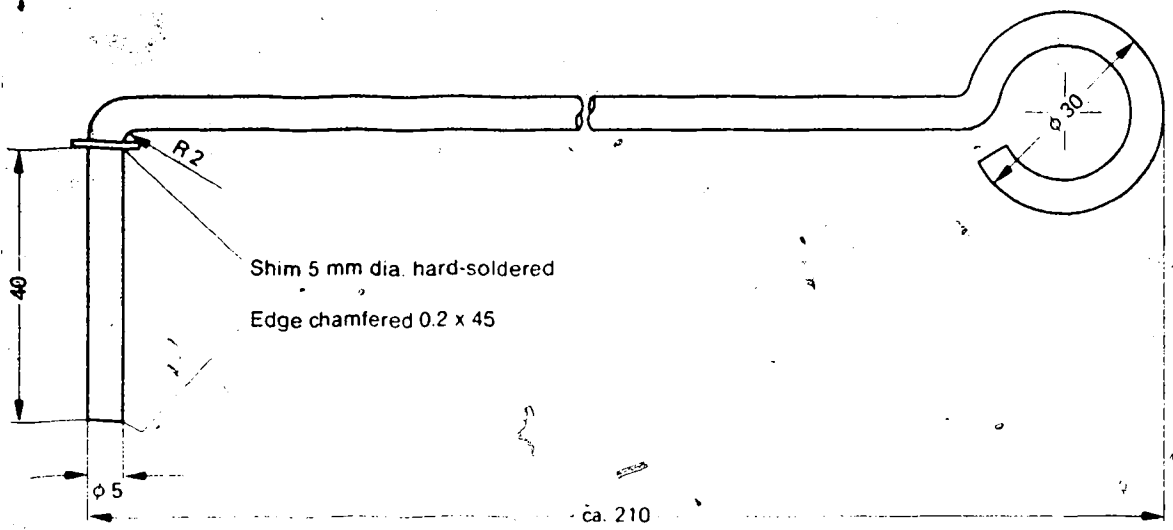


Fig. 2

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gersi al proprio rappresentante di zona.

FORD-Transit

FORD A 0406, A 0506

with VE-distributor-type fuel-injection pump

VDT-I-FOR 007 En

6.1980

Supersedes Ed. 8.1977

Since March 1977, the above-mentioned Ford vehicles with the 2.4 l, 4-cyl. York diesel engine have been fitted in ever-increasing numbers with the distributor-type fuel-injection pump 0 460 404 001 - VE 4/10 F 1800 R 14 with solenoid-operated shutoff device.

This combination replaces the injection-pump combination 0 400 084 008 - PES 4 M .. with EP/RSV governor and EP/SAZ .. timing device, the production of which stopped at end of 1977.

The VE..-distributor pump cannot be fitted as replacement in a vehicle previously equipped with the PES 4 M. pump. For this purpose, engine modifications (Ford matter), other nozzles and fuel-injection tubing would be necessary.

Notes on after-sales service

After-sales service is carried out on this VE..-distributor pump in the customary manner. The necessary technical documentation has been issued.

1. Technical documentation

Technical Bulletin "New Product":
VDT-I-460/1

Repair Instructions:
VDT-W-460/100 and Suppl. 2

Test Instructions:
VDT-W-460/300 and Suppl. 2

Service Parts:
Microfiche EP-142, Column A3, Ed. 77/1

Test Specifications:
Microfiche WP-413, Column E12, Ed. 77/4

Bosch Equipment:
Microfiche AE-77, Column A22, Ed. 77/3

Service Tools:
Catalog sheet KD-EP 9 D (11.75)

2. Tools for repair and testing

If tools are already available for the EP/VA..-distributor pump, then only those tools listed in the catalog sheet are required for the repair of this VE..-distributor pump.

KD service tools are to be ordered from KH/VKD 4.

For testing, the following equipment is needed in addition:

Timing-device-travel measuring device
1 688 130 139

Clamping bracket (for clamping the pump on the test bench) 1 688 010 101

Intermediate piece M 8x1 (setting the prestroke in connection with the prestroke measuring device 1 688 130 045)
1 683 458 019

Coupling half for taper dia. 20, 14mm long (for driving the pump)
1 686 430 010

Adjusting bolt KDEP 1108

Order this equipment from KH/ALP.

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3. Exchange pump

The distributor pump 0 460 404 001 has been included in the exchange program with the index 090.

4. Repair time

The number of work units for the repair and testing of the VE.-distributor pump have not been laid down yet. The maximum allowed for the complete disassembly is 35 AW (work units). Testing and adjustment together with the repair of a minor defect (for instance a leak) is allocated 16 AW. These figures are provisional.

5. Timing the pump to the engine

5.1 Fuel-injection pump with pointer and marked plate

Pump setting:

When the markings on the intermediate flange line up with the markings on the coupling half of the pump this corresponds to a plunger lift of 1.14 mm after TDC.

Engine setting:

TDC Cyl. 1.

5.2 Fuel-injection pump with locking plates

Pump setting:

Turn the coupling half (with drive gear wheel) so that the adjusting bolt KDEP 1108 can be pushed into both plates. This setting corresponds to a plunger lift of 0.36 mm after TDC.

Engine setting:

11° BTDC cyl. 1.

Ford Granada-Diesel

VDT-I-FOR 022 En
12.1979

Auxiliary starting device with

Glow-duration relay

0 333 402 004

Power relay

0 331 804 001

"R"-type sheathed-element

glow plug

0 250..

For additional information see "New Product" VDT-I-333/1 En.

1. Test equipment

Voltmeter

e.g.

MOT 002.00 0 684 000 200

Ohmmeter

e.g.

ETE 014.00 0 684 101 400

2. Troubleshooting program

2.1 Aim of troubleshooting program

While making use of all appropriate test equipment, this program is designed to help workshop employees quickly detect causes of trouble on engines with a pre-heating system.

2.2 Test sequence

The test steps given on the left-hand side of the troubleshooting program contain test information and test specifications. If the test step has a negative outcome, consult the boxes on the right-hand side opposite for the corresponding repair instructions.

3. Workshop information

3.1 We recommend that the "R"-type sheathed-element glow plugs be replaced every 45,000 km.

Note: If the fuel-injection pump is incorrectly adjusted, this may considerably reduce the service life of the sheathed-element glow plug.

3.2 In order to prevent the glow-duration relay from being irreparably damaged, the start repeater lamp must be fitted with a 12 V max. 2 W bulb.

3.3 For each repeat start the glow-plug and start-switch must, in order to obtain renewed pre-heating, first of all be turned to position 0 and then to position II. This makes it possible for the safety switch-off circuit fitted in the glow-duration relay to be re-activated.

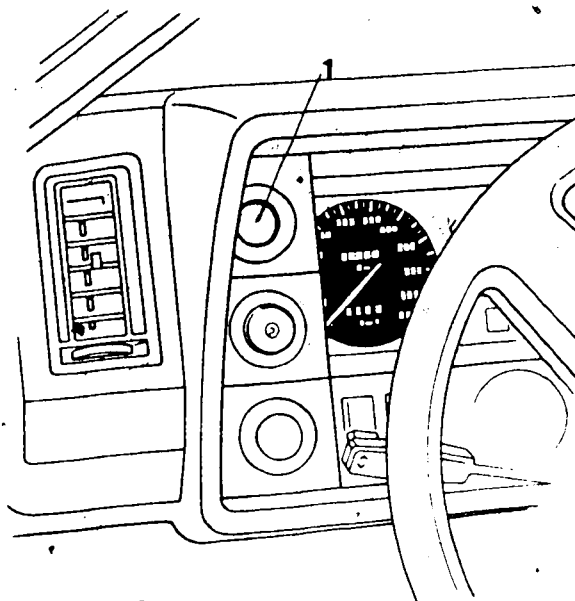


Fig. 1 1 = Start repeater lamp

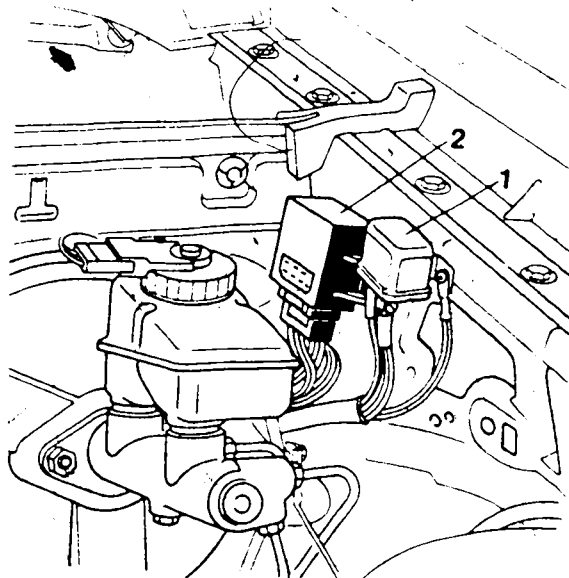


Fig. 2 1 = Power relay
2 = Glow-duration relay

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Troubleshooting program

Before testing, make sure of the following:

Battery fully charged, compression O.K. (if necessary, check pressure loss), fuel supply system and fuel-injection system O.K.

Starting motor turns and engine fails to start or starts only with great difficulty.

Yes

Check **voltage supply** to "R"-type sheathed-element glow plugs.
Connect voltmeter to power relay term. G and to ground.

Turn glow-plug and starter switch to position 0 and then to position II.

A minimum voltage of 10 V must be indicated for at least 20 seconds (temperature-dependent). After this time the system switches off automatically.

Caution: If the measurement has to be repeated, then the glow-plug and starter switch must be turned to position 0 and then to position II.

Minimum voltage present?

No

1. Voltage zero, then proceed on page 3 (voltage at glow-duration relay term. 15).

2. Voltage below 10 V, then check power circuit (positive terminal of battery) as well as term. 30 and G of power relay for voltage drop. Eliminate voltage drop.

Yes

Check **start repeater lamp**.

Turn glow-plug and starter switch to position 0 and then to position II.

Start repeater lamp must light up

Does start repeater lamp light up?

No

1. Check cable from glow-plug and starter switch term. 15 to glow-duration relay term. 15 and term. K including start repeater lamp for open circuit. Eliminate open circuit.

2. Check ground cable term. 31 from glow-duration relay for open circuit. Eliminate open circuit.

3. Check cable from power relay term. G to glow-duration relay term. G for open circuit. Eliminate open circuit.

4. If Points 1 to 3 O.K., then **replace glow-duration relay**.

Yes

Check **pre-heating time**.

Turn glow-plug and starter switch to position 0 and then to position II.

The pre-heating time (start repeater lamp lit up) must be

14 ... 22 seconds at an ambient temperature of 0° C

11 ... 19 seconds at an ambient temperature of + 10° C

8 ... 15 seconds at an ambient temperature of + 20° C

5 ... 11 seconds at an ambient temperature of + 30° C

2 ... 7 seconds at an ambient temperature of + 40° C

Pre-heating time (seconds) O.K.?

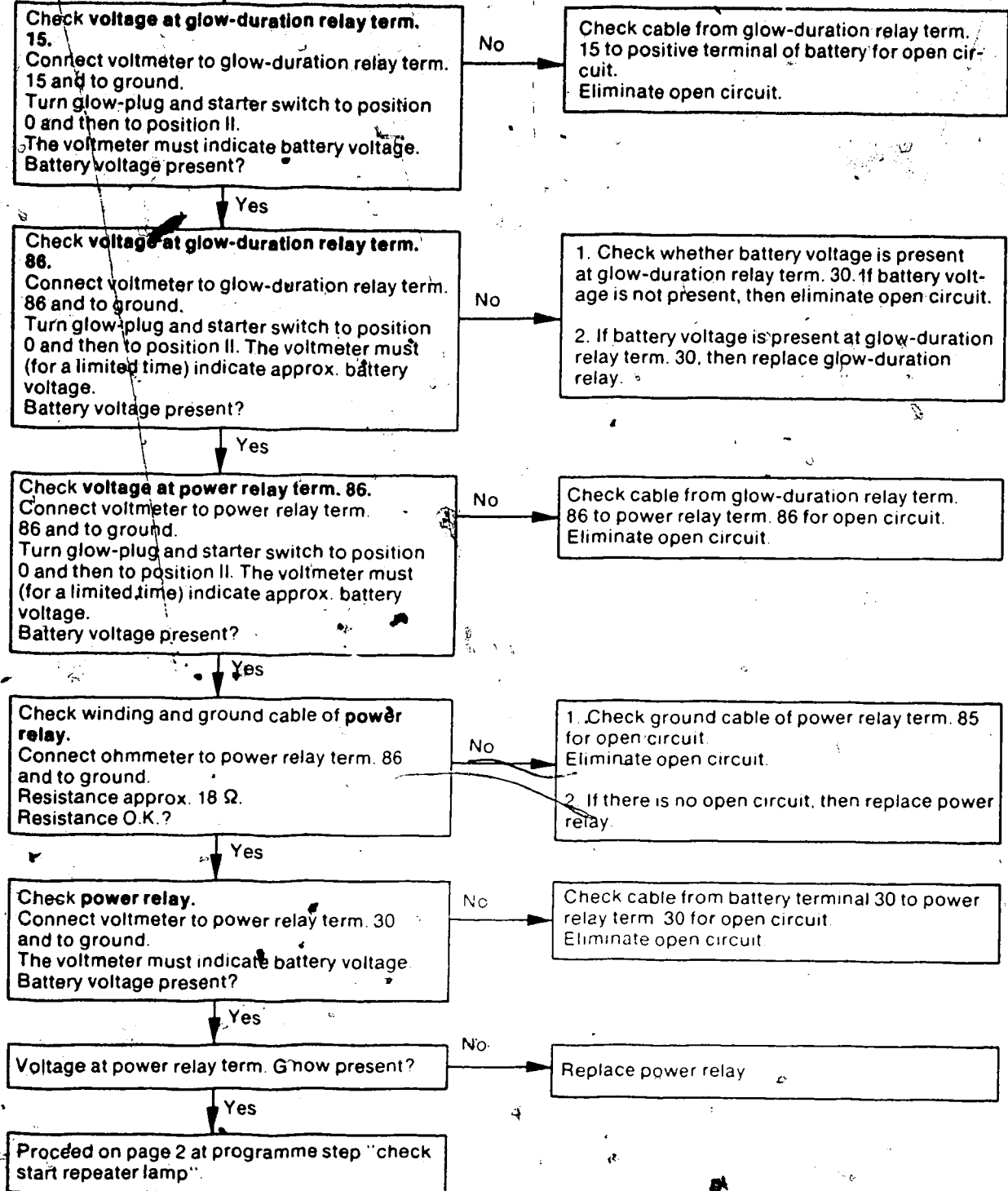
No

Replace glow-duration relay

Yes

Continued on page 4

Continued from page 2



Continued from page 2

Check safety switch-off circuit.

Connect voltmeter to power relay term. G and to ground. Turn glow-plug and starter switch to position 0 and then to position II. The voltmeter must indicate voltage for

- 34 ... 52 seconds at an ambient temperature of 0° C
- 31 ... 49 seconds at an ambient temperature of + 10° C
- 28 ... 45 seconds at an ambient temperature of + 20° C
- 25 ... 41 seconds at an ambient temperature of + 30° C
- 22 ... 37 seconds at an ambient temperature of + 40° C.

After the specified time the voltmeter must indicate 0 V.

Voltmeter at 0 V after specified time?

No

Replace glow-duration relay

Yes

Check glowing of glow plugs when starting motor is operated.

Connect voltmeter to power relay term. G and to ground. Turn glow-plug and starter switch to position III. Voltmeter must indicate a voltage of 6 ... 10 V. Voltage present?

No

1. Check cable from glow-plug and starter switch term. 50 to glow-duration relay term. 50 for open circuit. Eliminate open circuit.
2. If Point 1 O.K., then replace glow-duration relay.

Yes

Check "R"-type sheathed-element glow plugs. Check "R"-type sheathed-element glow plugs individually for continuity using ohmmeter.

O.K.?

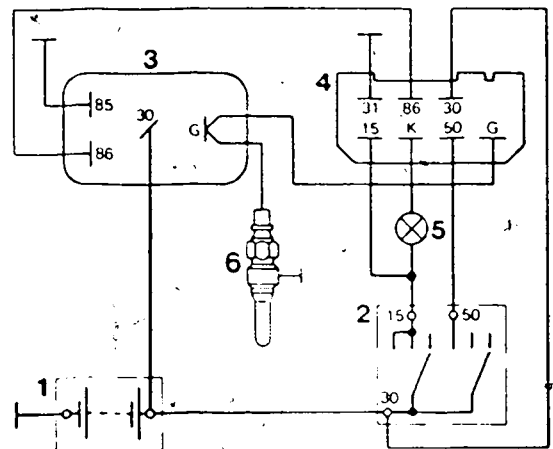
No

Replace "R"-type sheathed-element glow plug

Yes

Pre-heating system O.K.

Terminal diagram



- 1 Battery
- 2 Glow-plug and starter switch
- 3 Power relay
- 4 Glow-duration relay
- 5 Start repeater lamp (12 V 2 W)
- 6 "R"-type sheathed-element glow plugs

FORD ESCORT 1.3 l and 1.6 l

VDT-I-FOR 029 En

11.1980

with breakerless transistorized ignition TCI-i
and "Hybrid" trigger box with current limitation

Vehicle deliveries as from October 1980

Engine swept volume:	1.3 l	1.6 l	1.6 l Type XR 3
Power output:	51 kW	58 kW	71 kW
Rated engine speed:	6,000 min ⁻¹	5,800 min ⁻¹	6,000 min ⁻¹
Ignition point (without vacuum):	12° crankshaft BTDC		

The vehicles are fitted with a short-type ignition distributor which is flanged directly onto the cylinder head. It is driven from the camshaft.

The hybrid-technology trigger box is flanged directly onto the ignition distributor (2-component system).

The functioning of the trigger box is described in VDT-I-227/3.

When checking ignition systems which have the current-limiting facility, false readings can be displayed on the testers for engine speed, dwell angle and ignition point. Please refer to VDT-I-Gen. 030 and 032.

Technical documentation: Technical Bulletin "New Product" VDT-I-227/3

Trouble-shooting instructions: VDT-I-FOR 028

Equipment: On microfiche

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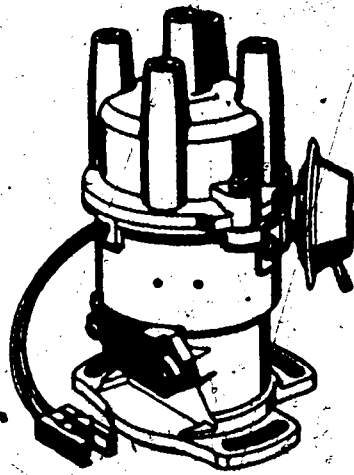
Electric Equipment

FORD ESCORT / ORION WITH
CVH ENGINE

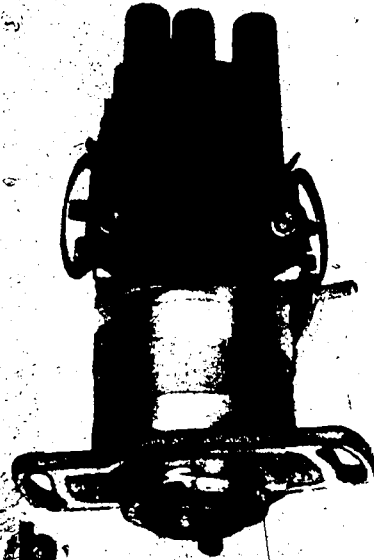
VDT-I-FOR 030 Ep

01.1986

Replacement ignition distributor



a



b

- a = Ignition distributor 0 237 600 ..
with 2-pin plug
- b = Ignition distributor 0 237 601 ..
with 3-pin plug

Ignition distributors 0 237 600 .. will in future no longer be available for replacements.

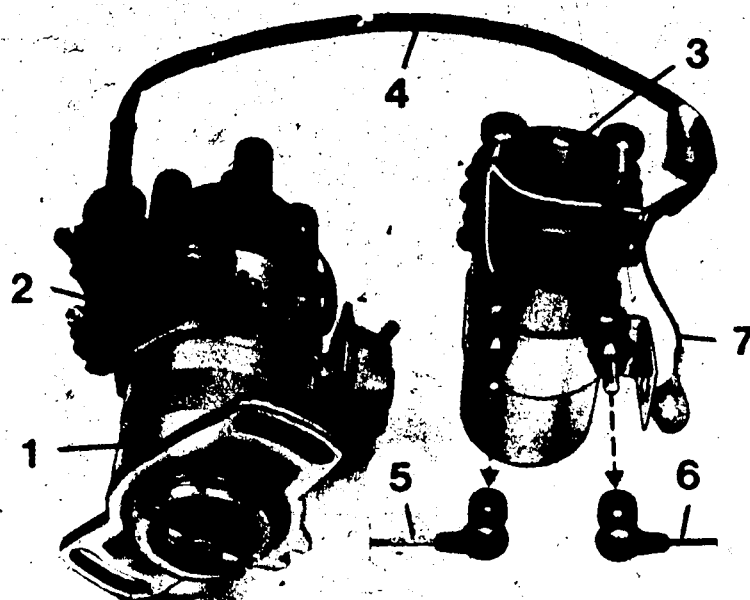
Ignition distributors 0 237 601 .. will be delivered instead. See picture b.

Motor Vehicle Service Information



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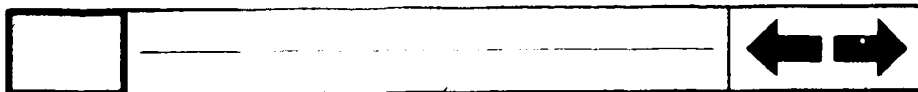


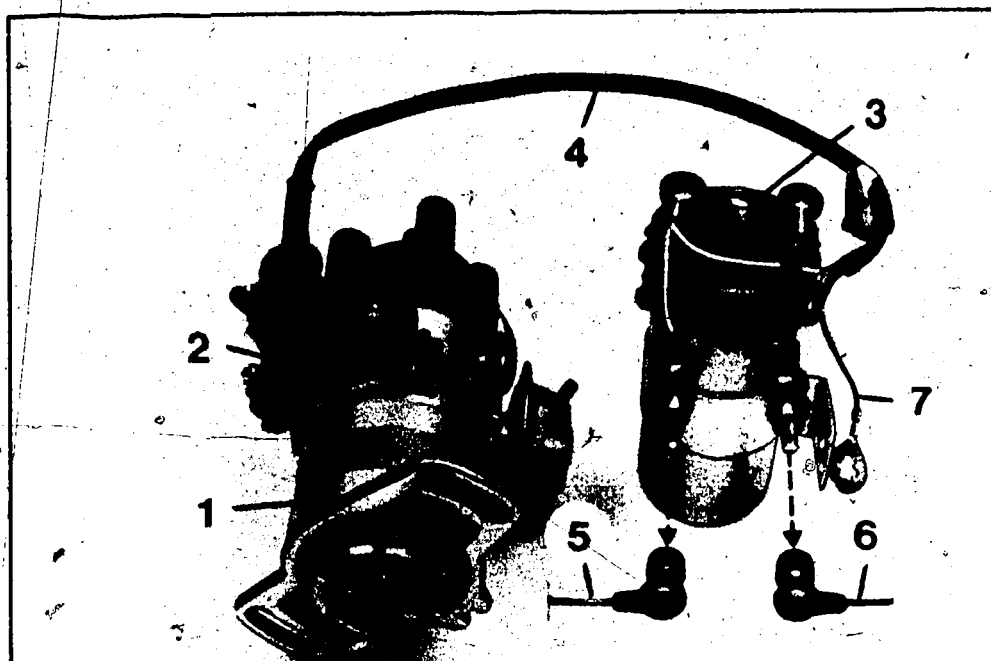
- 1 = Ignition distributor 0 237 601 ...
- 2 = TI-I trigger box
- 3 = Ignition coil
- 4 = Cable set (Ford service part)
- 5 = Existing green ignition-coil lead
- 6 = Existing black/yellow ignition-coil lead
- 7 = Brown ground lead

The new ignition distributor 0 237 601 ... has a 3-pin plug on the TI-I trigger box. This calls for an additional cable set (Ford part no. 6153 322) which is connected as follows:

Mount brown ground lead of cable set on ignition-coil clamp.

Connect green lead of cable set to ignition coil term. 1 (-), black lead to term. 15 (+).





- 1 = Ignition distributor 0 237 601 ..
- 2 = TI-I trigger box
- 3 = Ignition coil
- 4 = Cable set (Ford service part)
- 5 = Existing green ignition-coil lead
- 6 = Existing black/yellow ignition-coil lead
- 7 = Brown ground lead

Connect short green lead of cable set to existing green ignition-coil lead and short black lead to existing black/yellow ignition-coil lead. See picture, arrows.






The old 2-pin plug connector (picture, arrow) is insulated and attached to the wiring harness.

Published by:

Robert Bosch GmbH
Division KH
After-Sales Service Department for Training and
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Mercedes-Benz

VDT-I-MB 010 B

2. 1977

Replacement Ignition Distributors for 4- and 6-Cylinder Spark-Ignition Engines (with Carburetor) Manufactured up to the End of 1976

After stocks of ignition distributors used in the past have been exhausted, new ignition distributors must be installed in the 4-cylinder engines in vehicle models 180 b, 180 c, and 200 low compression (date of manufacture: 1967 or before) as well as in the 6-cylinder engines in vehicle models 219 to 250, 250 C, and 250 S (vehicles manufactured up to the end of 1976).

The following points must be observed when installing a new ignition distributor

1. 4-Cylinder Engine (date of manufacture: 1967 or before)

Ignition distributor 0 231 170 081 is a replacement distributor interchangeable with the distributor previously installed in the vehicle. The ignition timing must be adjusted, however (see Section 4)

2. 6-Cylinder Engine

Ignition distributor 0 231 187 001 has a double vacuum unit and has been installed in vehicle models 230 G, 250, 250 C and 250 S since the end of 1976

2.1. Vehicles with date of manufacture 1967 or before

The **vacuum unit** for **ignition timing retard** (connection directed toward the ignition distributor

housing) is **not connected** in these vehicles. In order to ensure proper operation of the timing adjustment mechanism, **this connection at the vacuum retard unit must not be closed**.

See Section 4 for adjustment values.

2.2. Vehicles with date of manufacture 1968 or after

except for vehicles manufactured for Japan and the USA

2.2.1. Vehicles with automatic transmission

Both vacuum units are connected. The connection to the "vacuum retard" unit is made as follows.

A distributor piece is installed in the vacuum hose leading to the vacuum controller. Install the vacuum line with rubber hoses as shown in Fig. 2 and connect it

2.2.2. In the case of vehicles with manually-shifted transmission, only the "vacuum advance" unit is connected.

The vacuum connection for ignition timing retard **at the vacuum unit must not be closed**.

When the modified ignition distributor is installed after the vehicle has left the manufacturing plant, the sticker giving the engine adjustment data must be replaced

Fig. 1

- 1 = Vacuum connection ignition timing advance
- 2 = Vacuum connection ignition timing retard

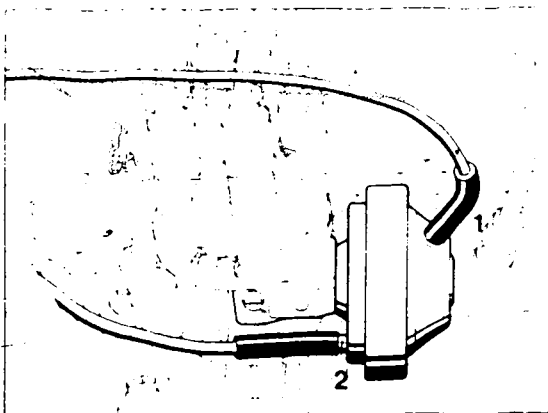
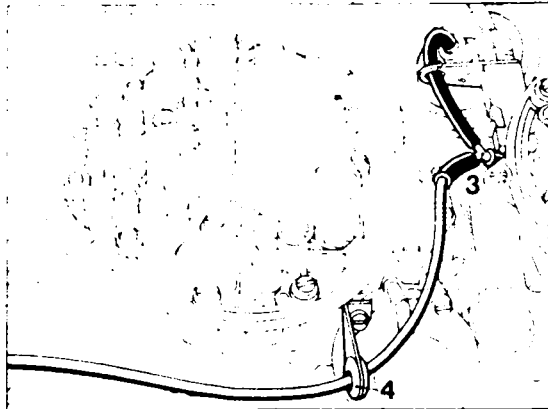


Fig. 2

- 3 = Distributor piece
- 4 = Hose clip



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2.3. Vehicles for Japan and the USA

The ignition distributors currently in use will be supplied until further notice.

3. Service Parts

Designation	Mercedes-Benz No.
Distributor piece	115 805 03 22
Vacuum line	000 158 35 35
Rubber hose	008 997 47 82
Hose clip	000 071 10 95
Rubber sleeve	000 997 22 81
Sticker Engine 130	130 584 09 38
Engine 180	114 584 12 40

Responsible for supply: Mercedes-Benz representative or branch office.

4. Adjustment Values

In order to adjust the timing, both vacuum lines must be disconnected.

Model	Compression ¹⁾	Engine	Ignition Distributor	Ignition Point before TDC (top dead-center) ²⁾
Normal compression				
180 b	7.0	121 923	0 231 170 081	43°
180 c	7.0	121 927		
219 ³⁾	7.6	180 921	0 231 187 001	37°
220 a ³⁾	7.6	180 921		
220 S ³⁾	7.6	180 924		
219	8.7	180 921	0 231 187 001	34°
220 S ³⁾	8.7	180 924		
220 b	8.7	180 940		
220 Sb	8.7	180 941		
230	9.0	180 945 180 949	0 231 187 001	34°
230 S	9.0	180 947	0 231 187 001	34°
250 S	9.0	108 920		
230 6	8.7	180 954		
250 and C	8.7 (9.0)	130 923		
250 and C	9.0	114 920		
Low compression				
200	7.0	121 940	0 231 170 081	52°
219 ³⁾	6.8	180 921	0 231 187 001	37°
220 S ³⁾	6.8	180 924		
220 b	7.0	180 940		
220 Sb	7.0	180 941		
230	7.2	180 945 180 949	0 231 187 001	37°
230 S	7.2	180 947	0 231 187 001	37°
250 S	7.7	108 924		
230 6	7.2	180 955		
250 and C	7.6	130 933		
250 and C	7.6	114 923		

¹⁾ cast into cylinder head

²⁾ without vacuum at crankshaft (engine) speed of 1500 rev/min

³⁾ In event of driving problems (for example irregular operation, problems when changing gears) and in event of complaints regarding idling, the ignition point may be advanced by a maximum of 2-3° (listen for pinging!)

Mercedes-Benz Passenger Cars

with K-Jetronic

Modified fuel pump

VDT-I-MB 016 B

9. 1977

Up to now Mercedes-Benz have employed fuel pump 0 580 254 984 (see also VDT-I-MB 006 B). This pump has now been superseded by 0 580 254 975. The pumps are identical in operation, but have different intake tubes, new 15 mm dia., old 12 mm dia. This change also required that the diameter of the intake tube on the damper device and of the fuel hose between the damper and fuel pump be altered.

This modification is intended to achieve uniform intake characteristics under all climatic conditions

The following parts are required for the conversion

from Bosch

Fuel pump	0 580 254 975
-----------	---------------

from Mercedes-Benz

Damping device	116 470 03 16
----------------	---------------

Fuel hose approx 50 mm long	107 476 01 26
-----------------------------	---------------

Hose clamp	91 6002 0211 00
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Mercedes-Benz

VDT-I-MB 017 B

Passenger-car Engines 100, 110, 116 and 117
with K-Jetronic

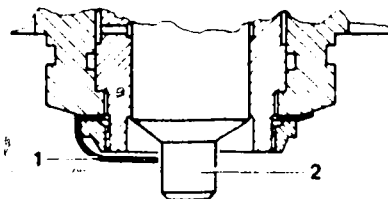
9. 1977

Fuel distributor with retainer to prevent control plunger dropping out

As from FD (date of manufacture) 724 the fuel distributors 0 438 100 011 and 012 for the above-mentioned engines have been fitted with a retainer to prevent the control plunger dropping out.

The retainer, in the form of a metal tab, also serves to secure the fuel distributor during transit and to facilitate installation.

The retainer must not be removed.



1 = Retainer
2 = Control plunger

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Mercedes-Benz

VDT-I-MB-024 En

Archiv/VDT

2.1979

Types 116.020 (280 S)
116.024 (280 SE)
116.025 (280 SEL)
116.028 (350 SE)
116.029 (350 SEL)
116.032 (450 SE)
116.033 (450 SEL)

Testing of headlight vertical aim control system 0 307 6 ...
(vacuum hand setting)

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Control switch position, depending on vehicle load

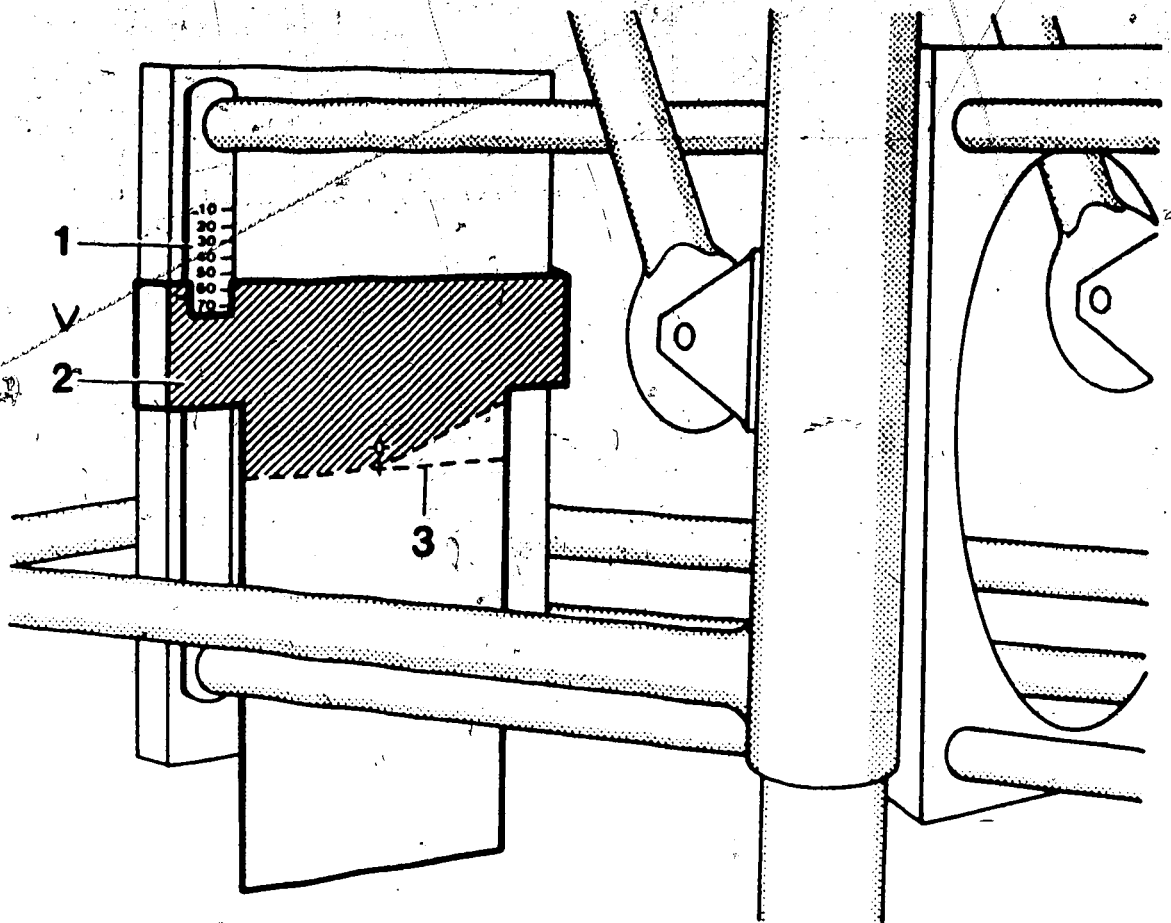
Control switch position	Load
0	Front seat or seats occupied
1	Front and rear seats occupied
2	Front and rear seats occupied plus load in luggage compartment not exceeding permissible rear axle load or Front seats occupied plus maximum load in luggage compartment (max. permissible load 100 kg)
3	May be required for towing

In the case of vehicles fitted with a level control system at the rear axle (option), the control switch is to be set, depending on the vehicle load, to the next lower position (e. g. position 1 instead of 2). The level control system largely compensates for the bounce produced by the rear axle load.



- 1 = Cover
- 2 = Spring clamp
- 3 = Seal

The rear cover (Fig. 4, Item 1) of the lamp unit is secured by means of a spring clamp (2) (previously a knurled nut). When installing the cover, it must be ensured that the rubber seal (3) is not twisted, because this would result in leaks. If the seal has to be replaced, it should be glued onto the cover.



- 1 = Setting scale
- 2 = Screen
- 3 = Setting line

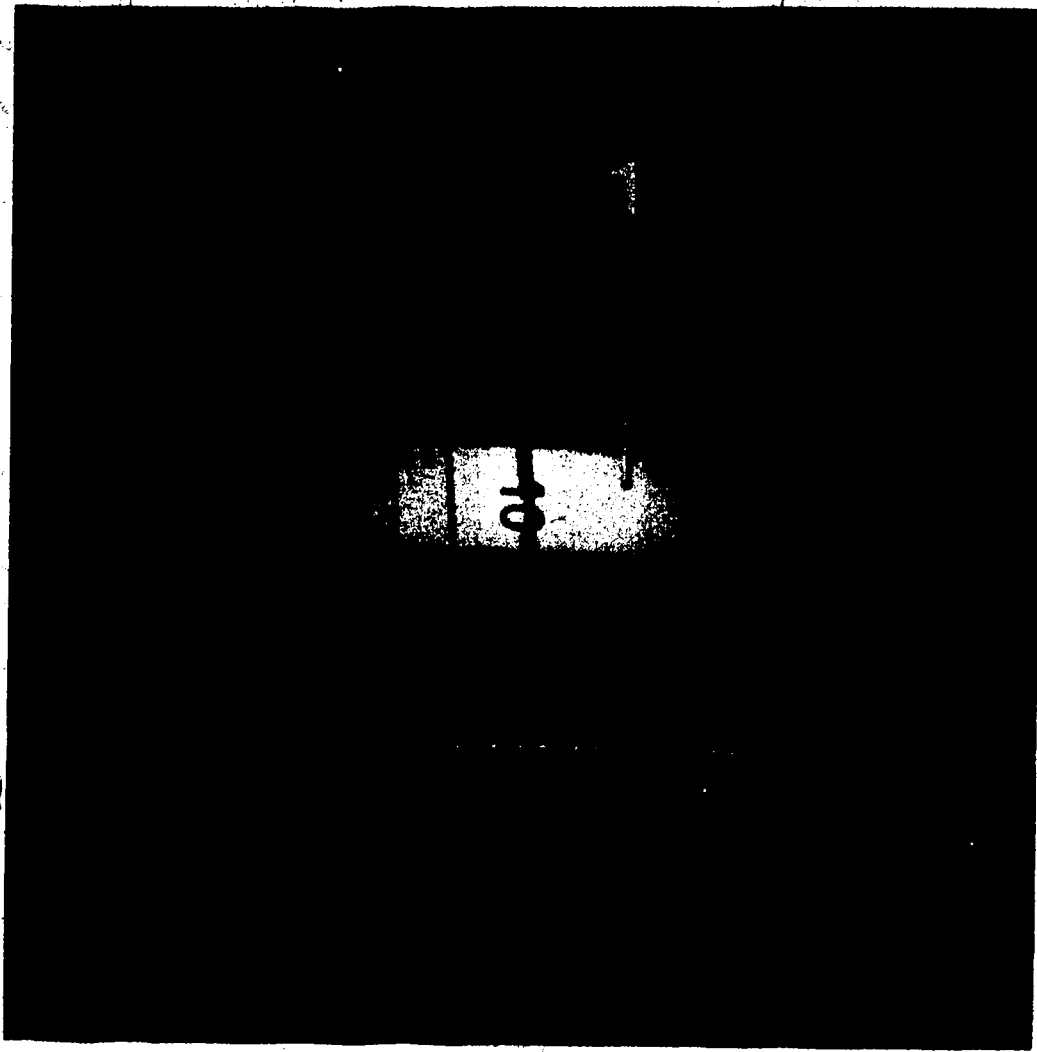
4. Headlight aiming

4.1 Requirements

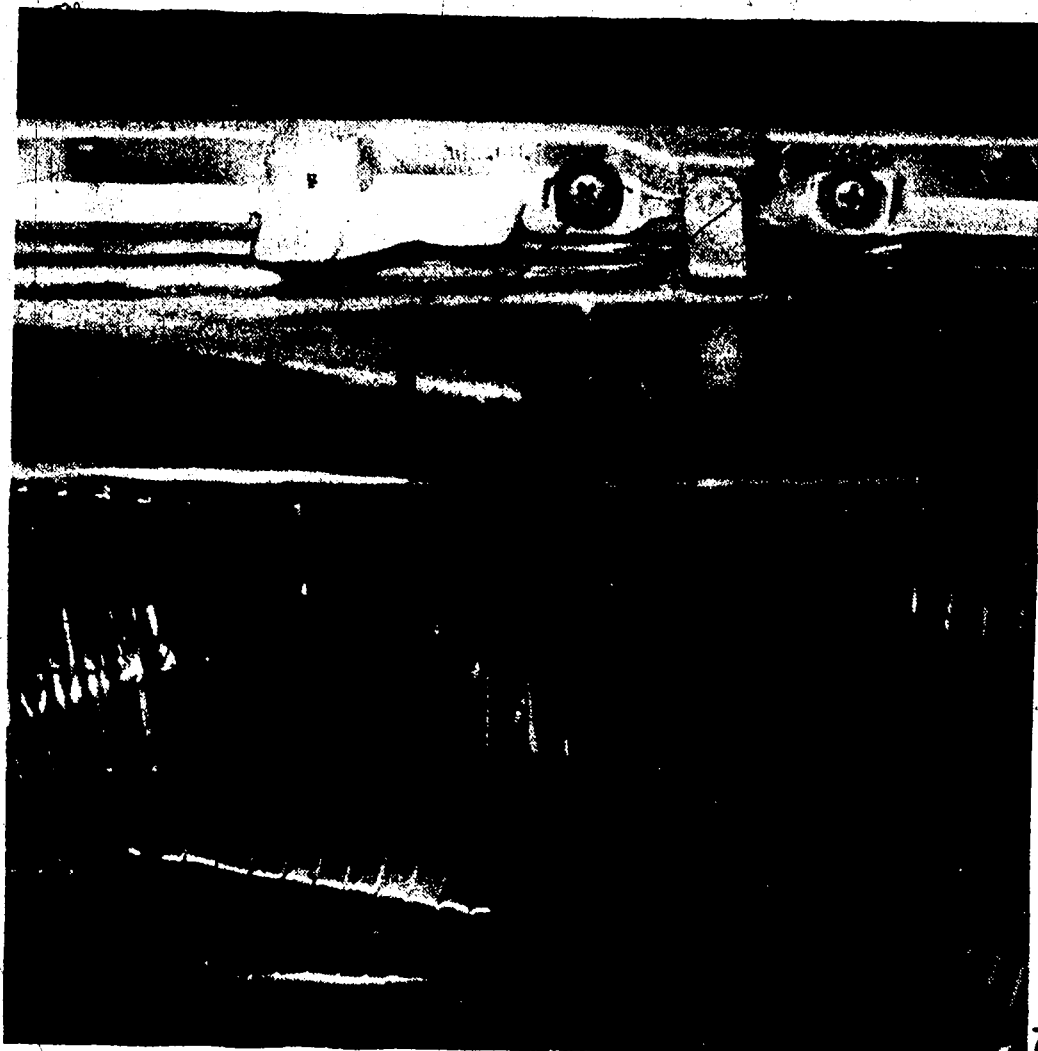
Correct tyre-inflation pressure, fuel tank completely full, driver's seat occupied by 1 person or with 75 kg load.

4.2 Checking headlight aiming or resetting headlights

Set up the headlight aiming device and set screen or knurled disc to "10 cm" (Figs. 5 and 6).

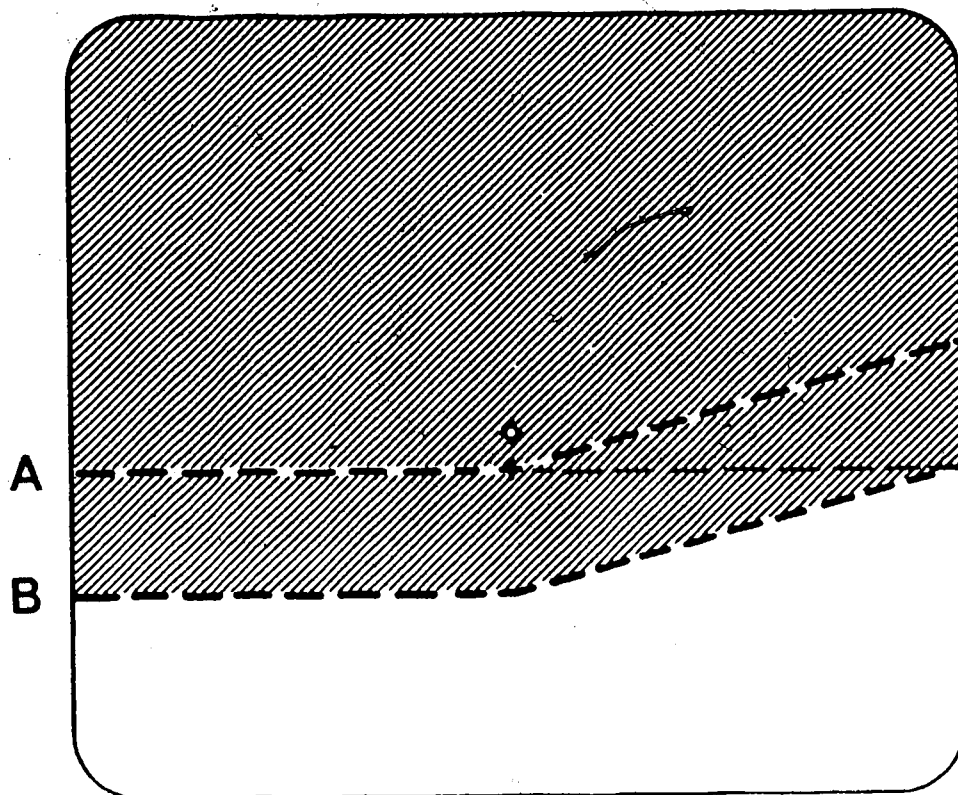


1 = Setting scale with knurled disc



1 = Height setting screw

Move control switch to basic position "0". Run engine, briefly depressing accelerator two to three times to ensure a vacuum of 400 mbar. Switch on dipped beam and check headlight aiming or reset headlights. The correct height of the headlights is ensured as previously by adjusting the height setting screw (Fig. 7).



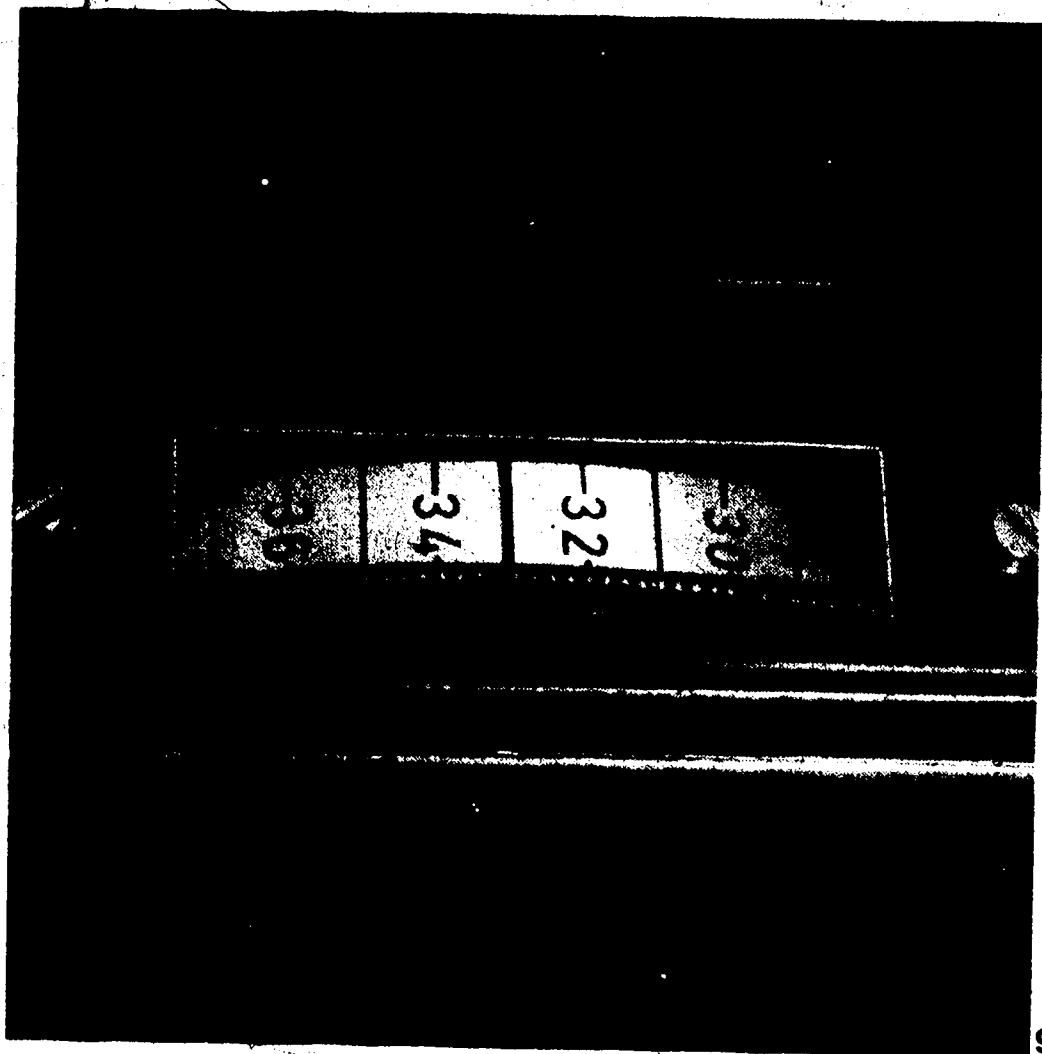
8

5. Checking range of adjustment of headlight vertical aim control system

Headlight aiming must have been carried out in accordance with Item 4.2.

With the engine running, move the control switch to position "3". The dipped beam light-dark zone boundary then moves from "A" to "B" (Fig. 8).

Move the screen or knurled disc on the headlight aiming device until the light-dark zone boundary which has moved downwards is once again reached by the setting line (Fig. 8).



If the headlight setting is correct, the setting scale must indicate values between 33 and 48 cm (Fig. 9). If these values are not reached, leakage and functional tests must be performed on the entire vacuum system **without** container in accordance with Item 6.

6. Leakage and functional testing of vacuum system without container

Note: On account of the higher degree of accuracy, the pressure gauges of a Bosch vacuum tester should be employed. The vacuum must be converted if use is made of old testers with a "mm Hg scale".

Example: $\frac{\text{mbar}}{1.33} = \text{mm Hg}$; e. g. $\frac{450 \text{ mbar}}{1.33} = 338.3 \text{ mm Hg}$

or

$\text{mmHg} \times 1.33 = \text{mbar}$; e. g. $338.3 \text{ mmHg} \times 1.33 = \sim 450 \text{ mbar}$

6.1 Leakage test on complete vacuum system

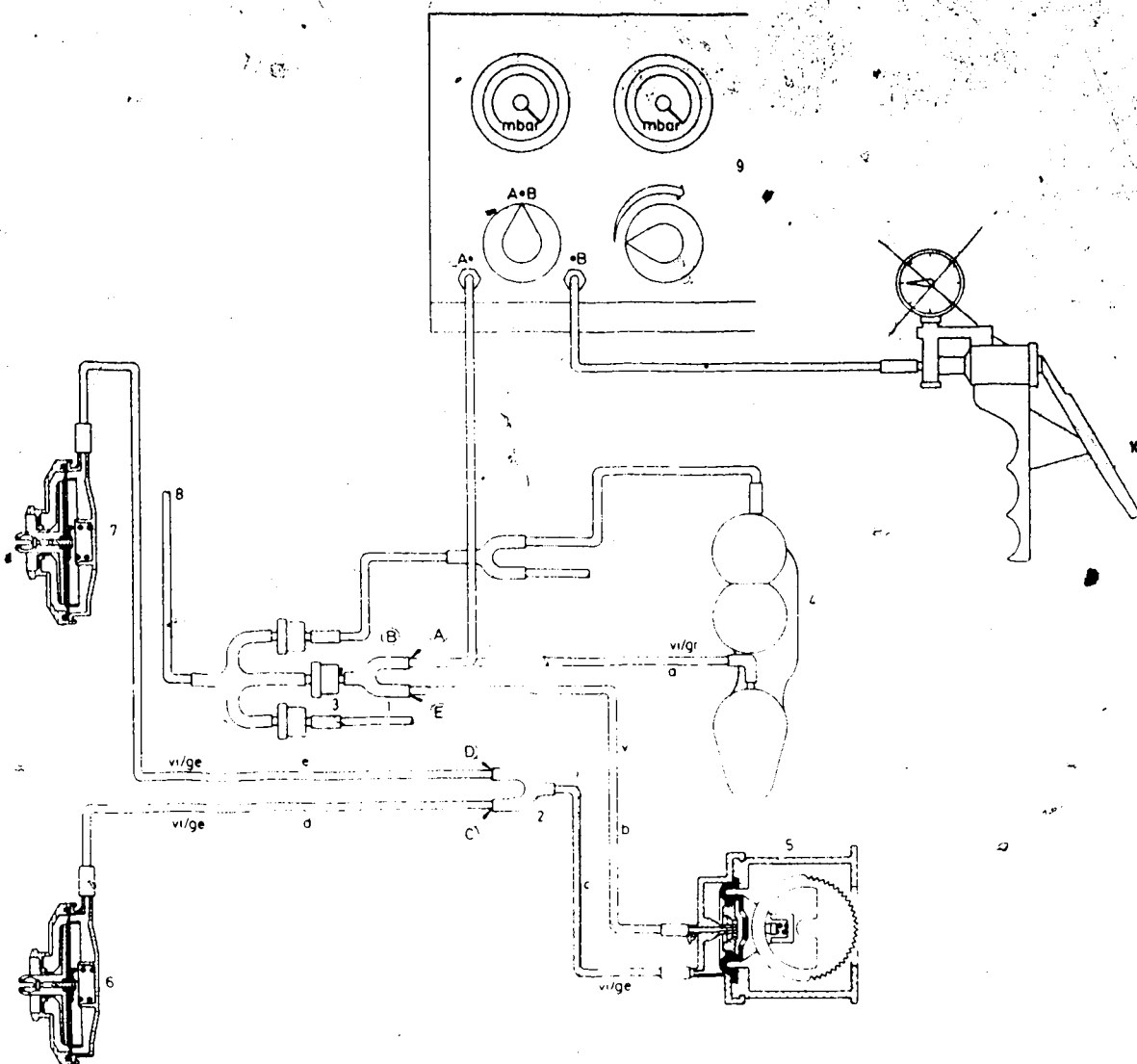
Remove violet/grey line (Fig. 10, Item a and Fig. 11, Item a) from branch piece 1 and connect vacuum pump and vacuum tester to test connection (A).

Note:

Control valve of vacuum tester is closed. Move control switch to position "0" and use vacuum pump to build up 450 mbar vacuum as indicated by vacuum tester.

Permissible vacuum drop as indicated by vacuum tester is 25 mbar within 10 seconds. If pressure drop within 10 seconds is less than 25 mbar, Items 6.5-6.7 are to be checked.

If pressure drop within 10 seconds is greater than 25 mbar, Items 6.2-6.4 are to be checked.



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Schematic representation of vacuum system

(A) (B) (C) (D) (E) - Test connections

a - Line to container (violet/grey)

b - Line to control switch input (violet)

c - Line from control switch output (violet/yellow)

d - Line to left-hand aim control element (violet/yellow)

e - Line to right-hand aim control element (violet/yellow)

1,2 - Branch pieces

3 - Non-return valve

4 - Vacuum container

5 - Control switch

6 - Left-hand aim control element

7 - Right-hand aim control element

8 - From vacuum connection at engine

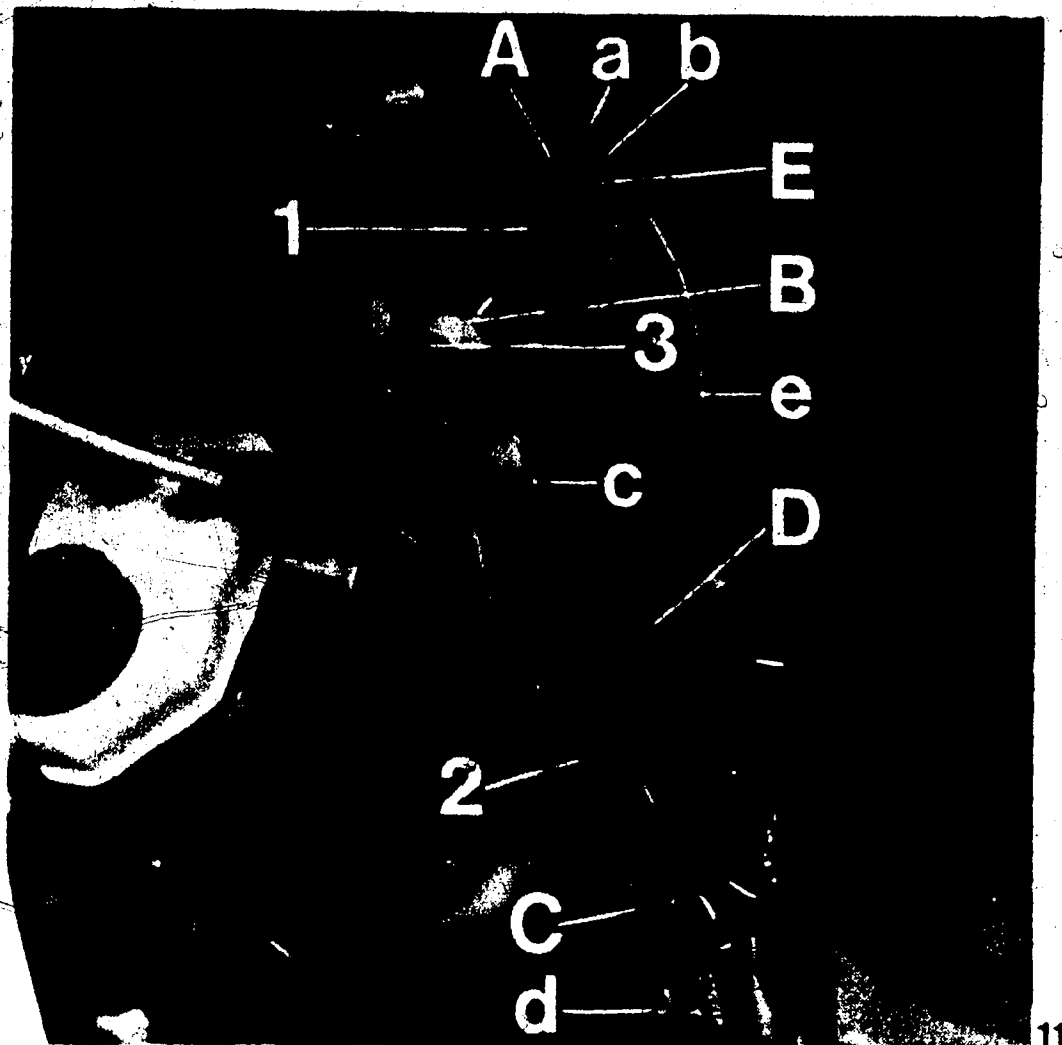
9 - Vacuum tester

10 - Vacuum pump

vi/ge - vi/ye

vi/gr - vi/gr

vi - vi



6.2 Leakage test on non-return valve

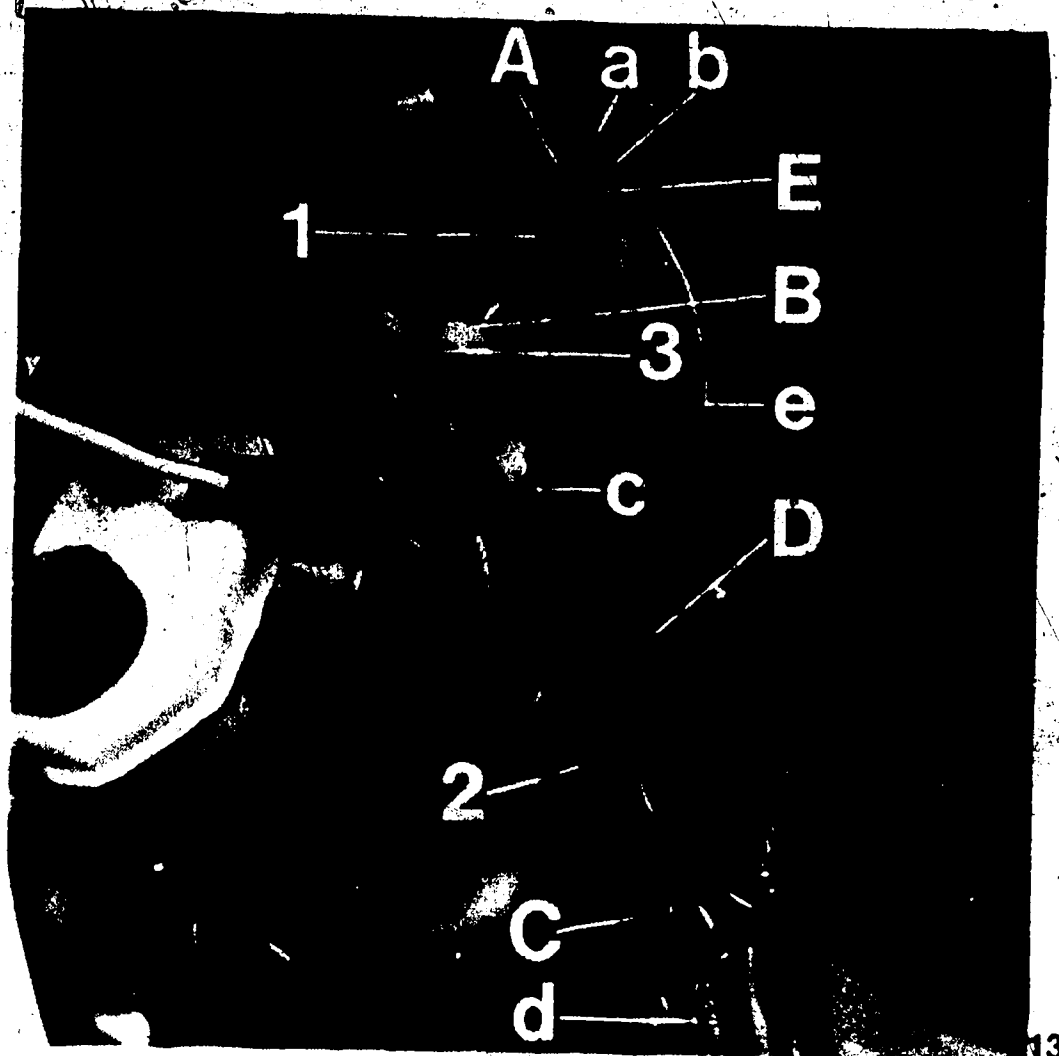
Disconnect pressure gauge from test connection (A).

Remove branch piece (1) from non-return valve (3) and connect pressure gauge to non-return valve (3) (Figs. 11 and 12).

Use vacuum pump to build up 300 mbar vacuum as indicated by vacuum tester. Permissible vacuum drop as indicated by vacuum tester 5 mbar/min.



vi/ge = vi/ye
vi/gr = vi/gr
vi = vi



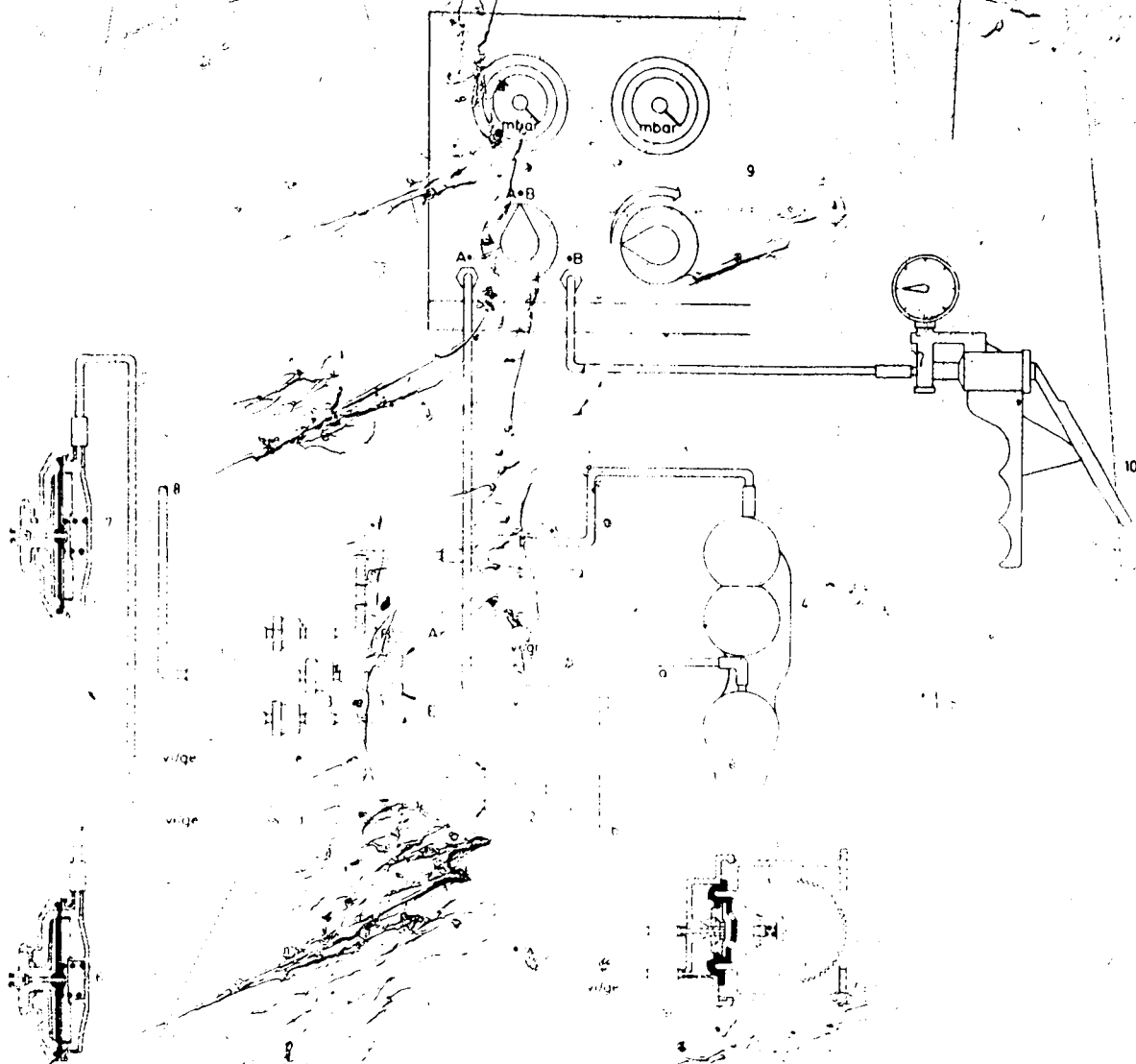
6.3 Leakage test on control switch with supply and control lines to branch piece

Disconnect pressure gauge from non-return valve (3) and reconnect branch piece (1) to non-return valve (3).

Remove violet/yellow line (c) from branch piece (2) and insert blind plug.

Remove violet line (Figs. 13 and 14, Item b) from branch piece (1) and connect to pressure gauge.

Move control switch to position "0" and use vacuum pump to build up 450 mbar vacuum as indicated by vacuum pump pressure gauge. Permissible vacuum drop as indicated by vacuum tester 30 mbar within 10 seconds.



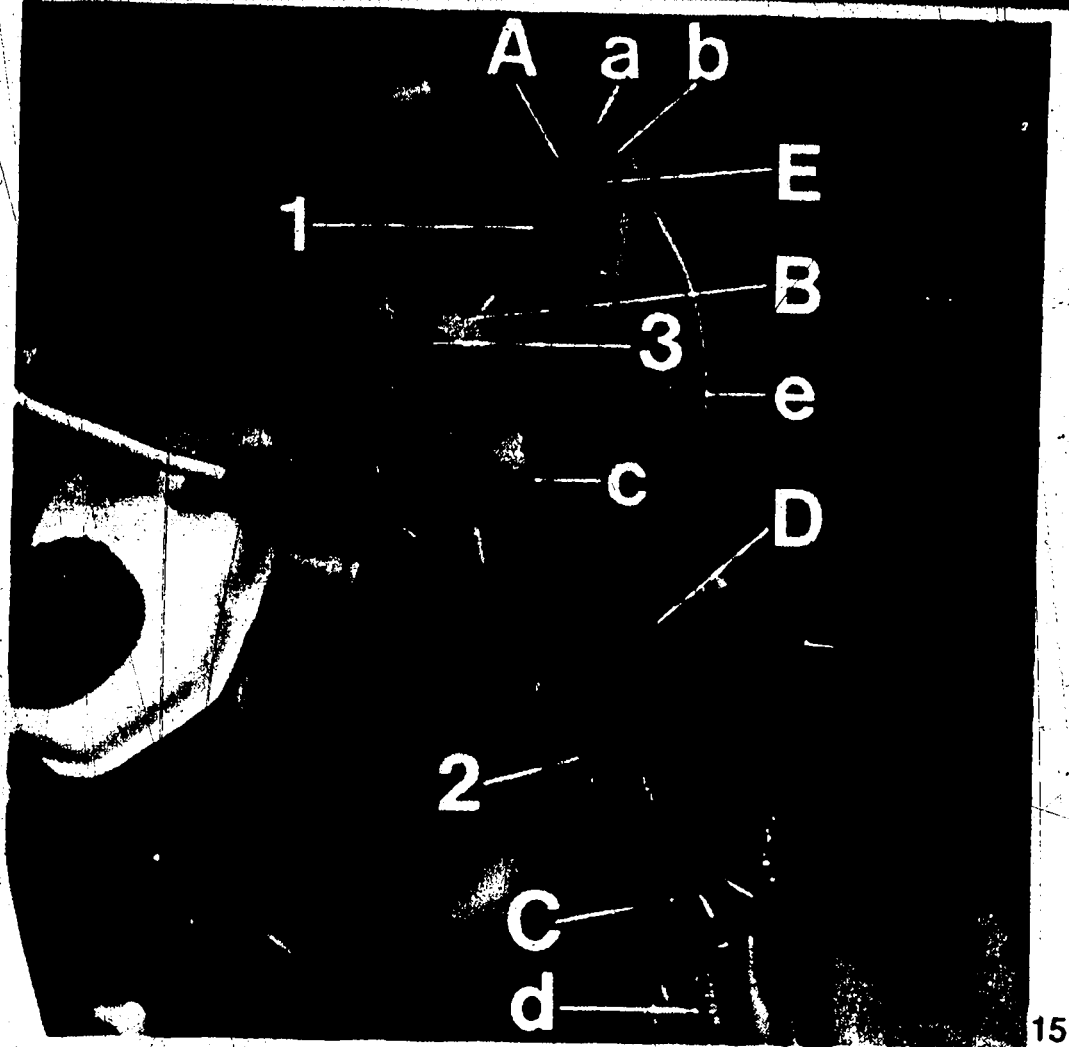
Schematic representation of vacuum system

14

- (A) (B) (C) (D) (E) = Test connections
 a = Line to container (violet/grey)
 b = Line to control switch input (violet)
 c = Line from control switch output (violet/yellow)
 d = Line to left-hand aim control element (violet/yellow)
 e = Line to right-hand aim control element (violet/yellow)

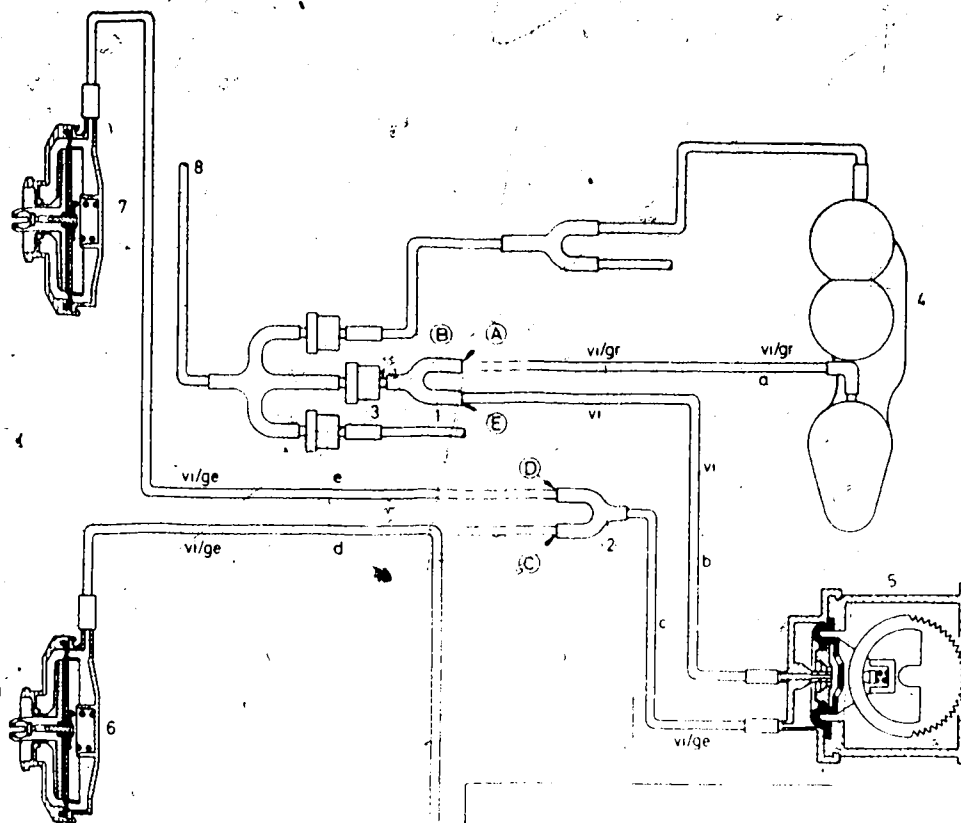
- 1, 2 = Branch pieces
 3 = Non-return valve
 4 = Vacuum container
 5 = Control switch
 6 = Left-hand aim control element
 7 = Right-hand aim control element
 8 = From vacuum connection at engine
 9 = Vacuum tester
 10 = Vacuum pump

vi/ge = vi/ye
 vi/gr = vi/gr
 vi = vi



6.4 Leakage test on aim control element with supply line on left and right-hand side

Disconnect pressure gauge from violet line (b) and reconnect it to branch piece (1). Remove blind plug from violet/yellow line (c) and reconnect it to branch piece (2) (Figs. 15 and 16). At branch piece (2) remove line (d or e) to aim control element and connect relevant line to pressure gauge (Figs. 15 and 16). Use vacuum pump to build up 300 mbar vacuum **as indicated by vacuum tester**. Permissible vacuum drop **as indicated by vacuum tester** 5 mbar/min. Reconnect violet/grey line (a) from container to test connection (A).



Schematic representation of vacuum system

(A) (B) (C) (D) (E) = Test connections

a = Line to container (violet/grey)

b = Line to control switch input (violet)

c = Line from control switch output (violet/yellow)

d = Line to left-hand aim control element (violet/yellow)

e = Line to right-hand aim control element (violet/yellow)

1, 2 = Branch pieces

3 = Non-return valve

4 = Vacuum container

5 = Control switch

6 = Left-hand aim control element

7 = Right-hand aim control element

8 = From vacuum connection at engine

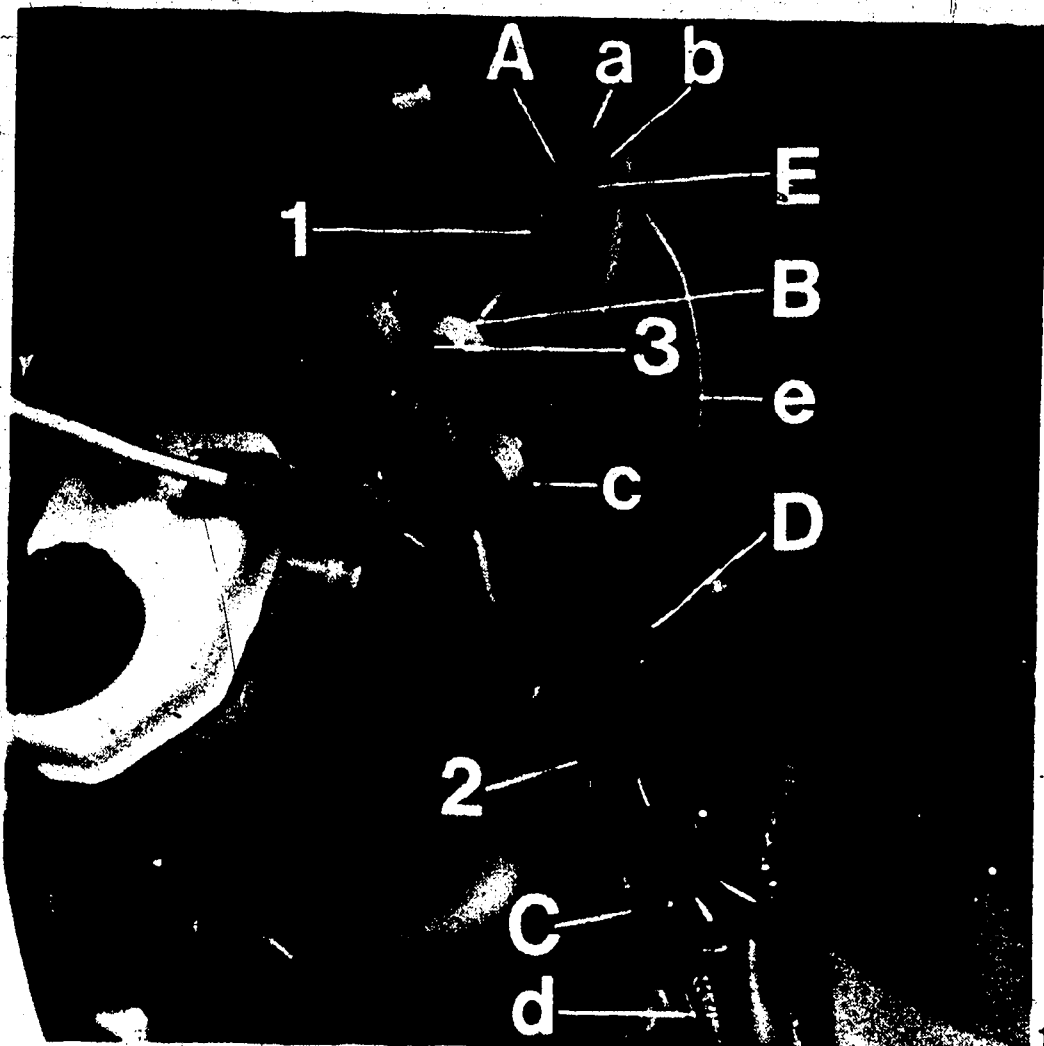
9 = Vacuum tester

10 = Vacuum pump

vi/ge = vi/ye

vi/gr = vi/gr

vi = vi



17

6.5 Functional test on control switch

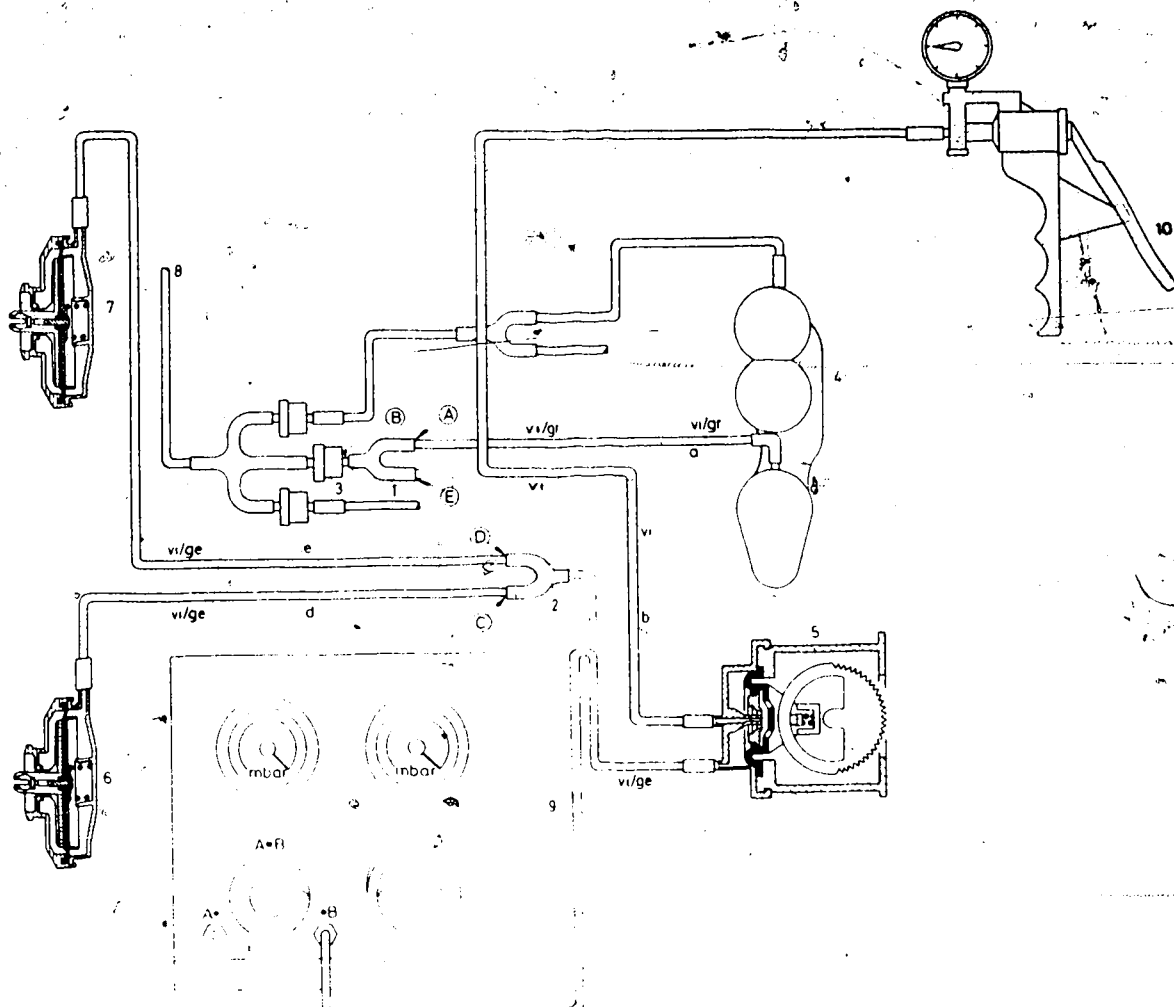
Connect vacuum pump to violet line (b) and pressure gauge to violet/yellow line (c) (Figs. 17 and 18). Move change-over cock of vacuum tester to position "B". Move control switch to position "0". Use vacuum pump to build up a vacuum of at least 450 mbar as indicated by vacuum pump pressure gauge.

Vacuum indicated by vacuum tester must be 400 ± 20 mbar.

Move control switch to position "3".

Vacuum indicated by vacuum tester must be 50 ± 20 mbar.

If specified values are not reached, control switch must be replaced.



18

Schematic representation of vacuum system

(A) (B) (C) (D) (E) = Test connections

a = Line to container (violet/grey)

b = Line to control switch input (violet)

c = Line from control switch output (violet/yellow)

d = Line to left-hand aim control element (violet/yellow)

e = Line to right-hand aim control element (violet/yellow)

1, 2 = Branch pieces

3 = Non-return valve

4 = Vacuum container

5 = Control switch

6 = Left-hand aim control element

7 = Right-hand aim control element

8 = From vacuum connection at engine

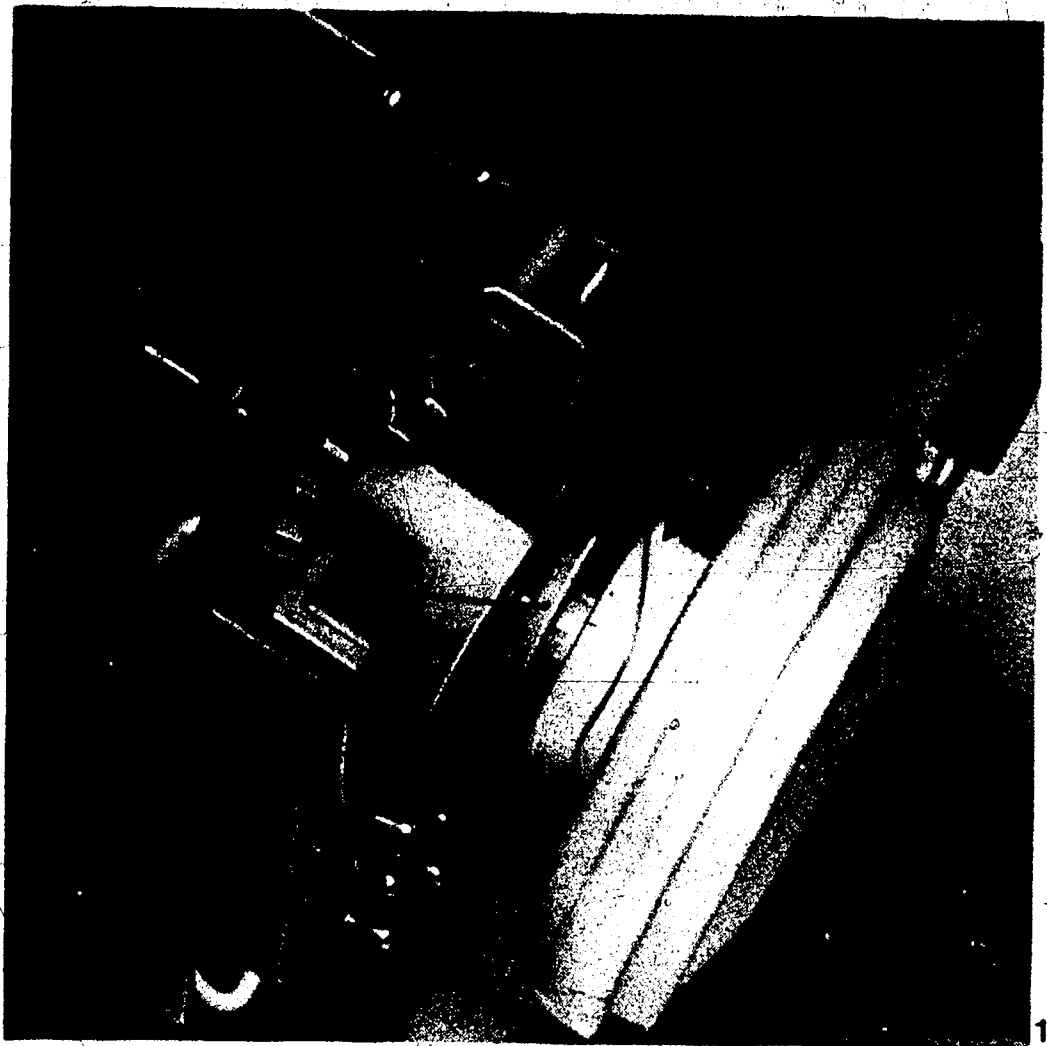
9 = Vacuum tester

10 = Vacuum pump

vi/ge = vi/ye

vi/gr = vi/gr

vi = vi



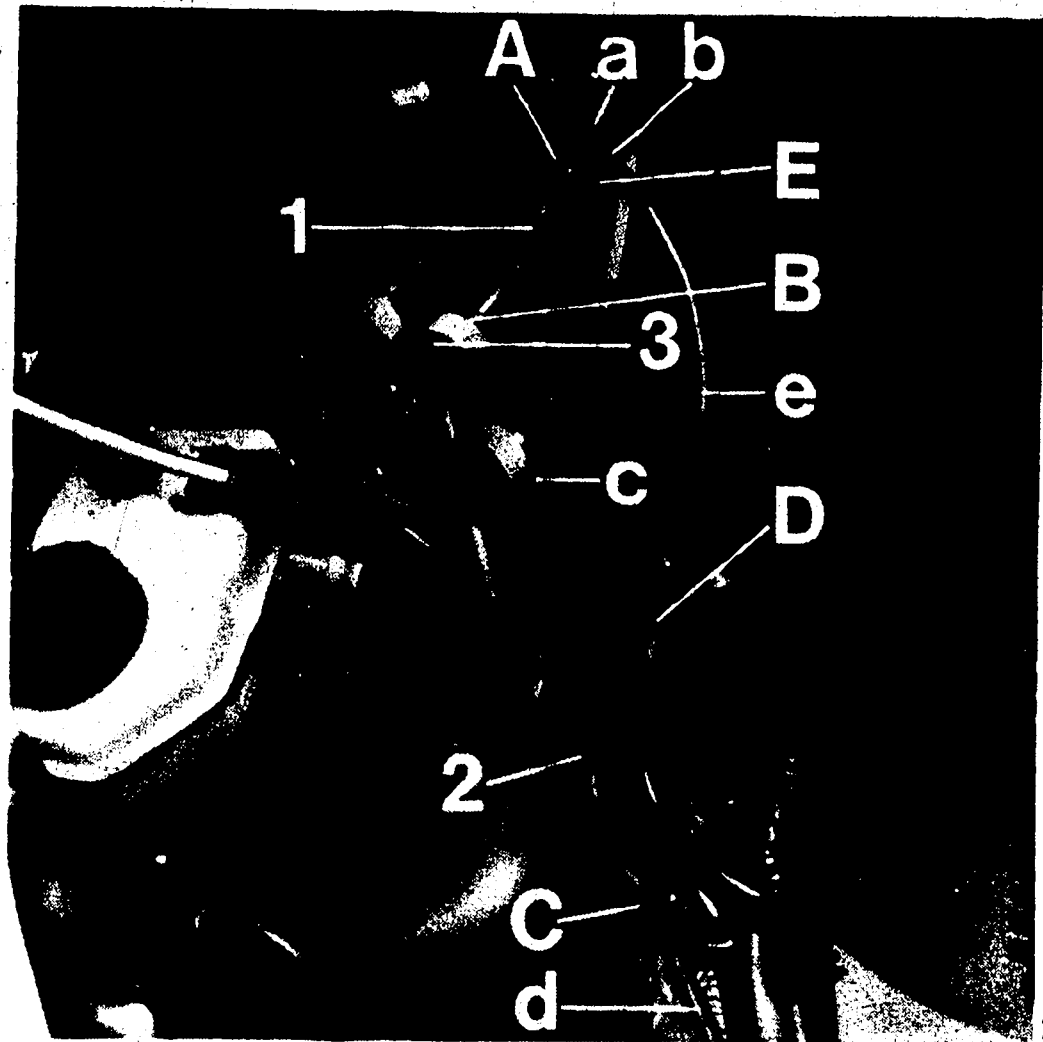
- 1 = Red safety device
- 2 = Control line

6.6 Checking freedom of movement of reflector on left and right-hand side

Remove lamp unit cover and disconnect aim control element from bayonet socket by turning it anti-clockwise through 45°. Remove control line.

Force off red safety device (Fig. 19, Item 1) from aim control element and remove aim control element from ball head of tie rod.

Move reflector by hand and check freedom of movement.



6.7 Checking stroke of aim control element on left and right-hand side

Connect vacuum pump and pressure gauge to violet line (b) (Figs. 20 and 21).

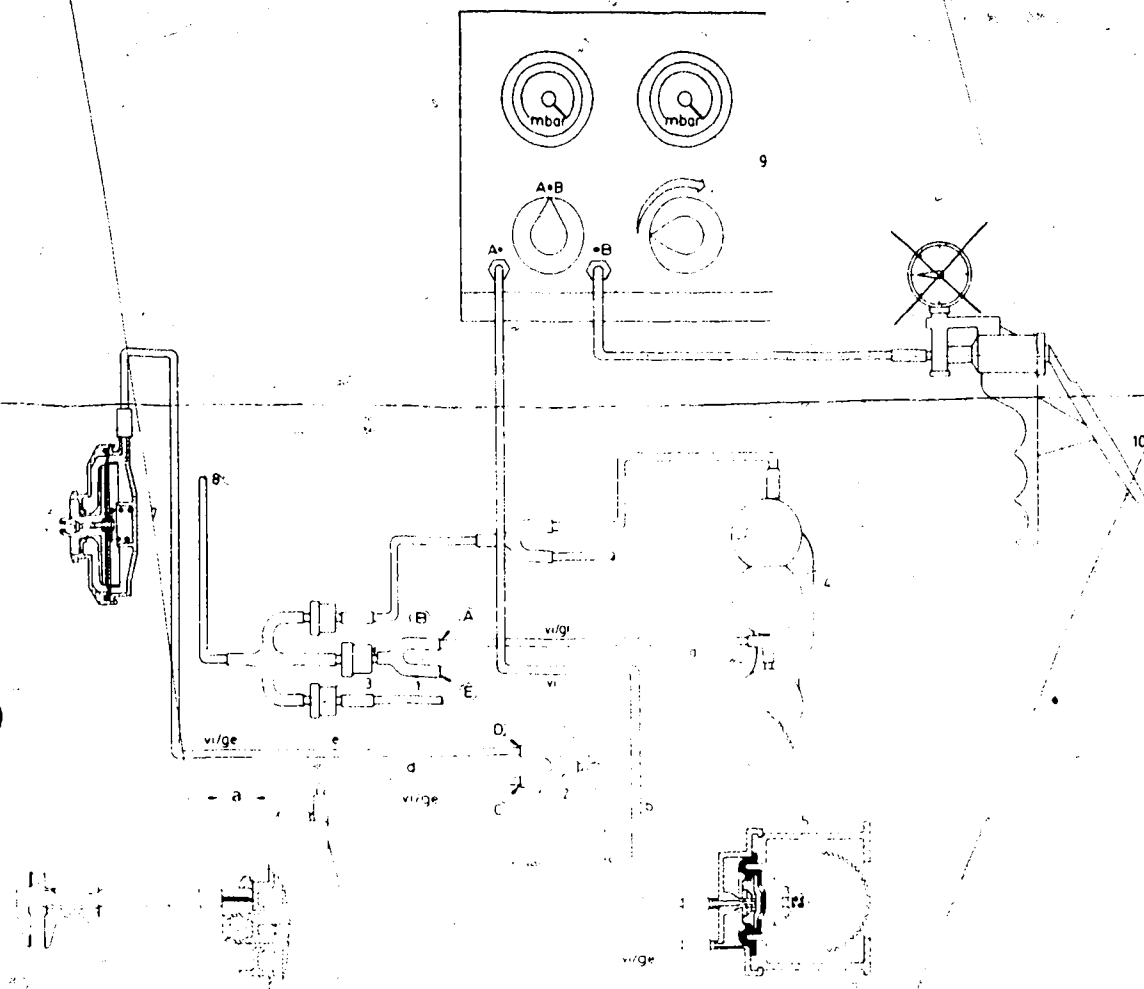
Move control switch to position "0".

Use vacuum pump to build up a vacuum of at least 450 mbar **as indicated by vacuum tester**. Measure piston projection at aim control element using slide caliper (Fig. 21).

Move control switch to position "3" and measure new projection. If difference between both measurements is less than 2.8 mm, aim control element must be replaced.

Note:

When installing the aim control element, it is **essential** that the red safety device be forced back into position.



21

a = Piston projection

Schematic representation of vacuum system

(A) (B) (C) (D) (E) = Test connections

a = Line to container (violet/grey)

b = Line to control switch input (violet)

c = Line from control switch output (violet/yellow)

d = Line to left-hand aim control element (violet/yellow)

e = Line to right-hand aim control element (violet/yellow)

1, 2 = Branch pieces

3 = Non-return valve

4 = Vacuum container

5 = Control switch

7 = Right-hand aim control element

8 = From vacuum connection at engine

9 = Vacuum tester

10 = Vacuum pump

vi/ge = vi/ye

vi/gr = vi/gr

vi = vi

MERCEDES-BENZ 450SE, SEL, SL, SLC

VDT-I-MB 025 En

Engines 100 and 117 with K-Jetronic

4.1979

Modified warm-up regulator mounting

In the case of the 6.9 l and 4.5 l engines, the warm-up regulator is no longer held using a mounting piece but is fitted directly to the intake manifold.

The Tecalan control-pressure line fitted between the fuel-line-pressure damper and the warm-up regulator has been replaced by a steel control-pressure line with a Tecalan lining.

<u>Series production:</u>	<u>Type</u>	<u>As from chassis final number</u>
	107.024	013 543
	107.044	032 743
	116.032 }	052 125
	116.033 }	
	116.036	001 501

Note:

The following service parts are no longer available:

Mounting piece for warm-up regulator
Rubber discs
Tecalan control-pressure line
Return line
Fuel-line-pressure damper for engine 117

If such parts are required for vehicles with a low chassis final number, the warm-up regulator mounting is to be modified.

MB parts required for engine 100

MS Part Number

Steel control-pressure line	100 070 61 32
Return line	100 070 58 32
Mounting piece for ignition cables	116 159 04 40
Rubber sleeve	100 997 08 81
Hexagon screw M8 x 16	000 933 008 214
Plastic clips	117 078 04 41
Hexagon screw M6 x 45	000 912 006 034

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MB parts required for engine 117

MB Part Number

Steel control-pressure line	117 070 31 32
Return line	117 070 30 32
Mounting piece for fuel-line-pressure damper	117 078 03 41
Mounting piece for ignition cables	116 159 28 40
Fastening clamp	916 016 022 203
Plastic clips	117 078 04 41
Hexagon screw M6 x 15	000 933 006 026

Fuel-line-pressure damper Bosch Part Number 0 280 161 007

Mounting:

1. Remove all connections from the warm-up regulator and screw the warm-up regulator off of the manifold piece.
2. Screw the mounting piece, together with the rubber discs, off of the manifold.
- 3.1 Engine 100 Unscrew the injection line from cylinder 4 and unhook the control rod. Remove the bearing piece for the control rod, as well as the fuel-line-pressure damper and the control-pressure line. The mounting piece for the ignition cables (cyls. 1-4) is also to be removed.
- 3.2 Engine 117 Unscrew the fuel-line-pressure damper together with its mounting piece.
4. Fit the warm-up regulator directly to the manifold without the mounting piece (Figs. 1 and 2).

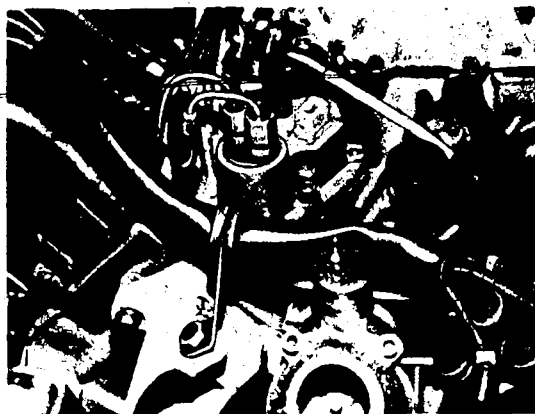


Fig. 1

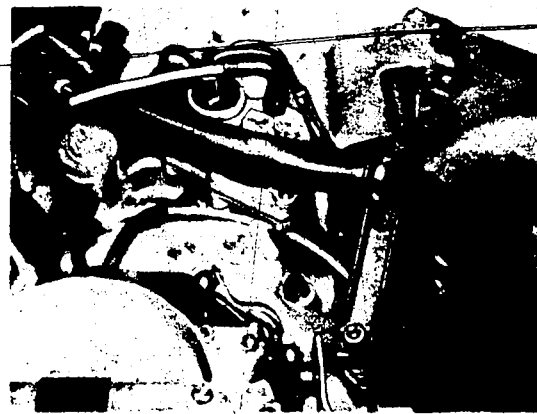


Fig. 2

5. Screw the new steel control-pressure line and new return line to the fuel-line-pressure damper (do NOT yet tighten fully). Fit the fuel-line-pressure damper. With the engine 117, a new fuel-line-pressure damper and a new mounting piece are to be used.
6. Route the control-pressure line and the return line so that they are not under stress and cannot chafe. With the engine 117, the spark-plug connectors for cyls. 1-4 must be pulled off for this operation.
7. Tighten the control-pressure line and the return line and secure with the plastic clips.
8. In the case of engine 100, the injection line to cylinder 4 and the bearing piece for the control rod are to be re-fitted.
9. Hook-in the control rod again. Check for ease of movement and setting, re-adjust if necessary.
10. Plug-in the electrical connection to the warm-up regulator and connect the vacuum connections, they are to be routed so as to be free from stress. If necessary, shorten the vacuum lines.
11. Fit the ignition lines (Figs. 1 and 2) and secure with new holder. With the engine 100, before carrying out this step fit the new rubber sleeve over the ignition cables (cyls. 1-4).
12. Start the engine, let it run, and check for leaks.

MERCEDES-BENZ W 116, W 126, R 107

VDI-I-MB-030 En

Antiskid System (ABS)

Archiv/VDI

5.1980

New control lamp function
New controllers
Interchangeability of controllers

03. Jan 1980

Former control lamp function

When the ignition is switched on the control lamp lights up. When the vehicle reaches a speed of more than 6 km/h (with all 4 wheels), the lamp goes out. This procedure repeats itself every time the ignition is switched on and off.

IF THE ABS-SYSTEM IS DEFECTIVE the control lamp lights up continually at speeds over 6 km/h and signals to the driver that the ABS is switched off.
THE NORMAL BRAKE STILL WORKS.

New control lamp function

IF THE ABS-SYSTEM IS INTACT the control lamp lights up when the ignition is switched on and goes out as soon as the engine starts running. The controller receives the information "engine running" via terminal 61 of the alternator. As before, when the speed of the vehicle exceeds 6 km/h the ABS carries out a self-check. It is possible that the control lamp will flicker for a short while.

IF THE ABS-SYSTEM IS DEFECTIVE the control lamp lights up at the latest when the speed of the vehicle exceeds 12 km/h. (At 12 km/h the wheel-speed sensors are checked).

Occasional lighting-up of the control lamp may be caused by an insufficiently charged battery. The lamp remains lit as long as there is under voltage, e.g. when other current consuming devices are switched on whilst the vehicle is stationary.

New Controllers

In the engine compartment of the new S class, a "controller room" has been created in which the ABS controller is also housed. This has resulted in better sealing measures being required. As an intermediate solution, controllers 0 265 101 004, .. 005 have received an adhesive strip of white fabric around the front plate, the screw connections have been sealed and the position of the ventilation hole has been changed. In addition a cover, which is part of the ABS wiring harness, is placed over the controller plugs. The new controller designs 0 265 101 006, .. 007 (from approx. 5.80) will be produced in the factory with seals lying inside. The cover on the wiring harness can then be dispensed with. The cover fits over both types of controller.

Interchangeability of controllers

The fitting of controllers with the new control lamp function in vehicles with the old control lamp function is permitted and is possible electrically. In all existing vehicles the necessary cable from alternator terminal 61 to terminal 15 of the controller has already been laid.

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The customer, however, must be made aware in this case of the modified control lamp function.

Important note

Controllers 0 265 101 002, .. 003 are only suitable for fitting in the passenger compartment and for safety reasons must not under any circumstances be fitted in the controller room. Damage can be caused by water and the ABS can be put out of action!

Controller B 265 101 005 (0 265 101 008) has been produced in small quantities for trials. As a replacement please use the controllers given in the table.

Controller part no.	Permitted mounting place	Remarks	Control lamp function	Replacement
0 265 101 002 x .. 003 xx only type 116	only in the passenger compartment	Without special seal	Old	0 265 101 005 or 0 265 101 007
0 265 101 004 x .. 005 xx from 10.79	Controller room and passenger compartment	Intermediate solution with white adhesive strip	Old	0 265 101 007
B 265 101 005 x 0 265 101 008 x approx. 11.79 - 4.80	Controller room and passenger compartment	Limited quantity (with white adhesive strip)	New	0 265 101 007
0 265 101 006 .. 007 From approx. 5.80	Controller room and passenger compartment	With inside seal	New	0 265 101 007

x Factory design
xx Sales design

Note on ordering:

Controllers should only be acquired in exchange (exception: destruction e.g. due to accident).

MERCEDES-BENZ 200, 230 E, CE, TE

VDT-I-MB 034 En

Type 123, Engine M 102

7.1980

Mounting instructions for new spark plugs

New spark plugs with conical seats (without seal ring) are being fitted in the above mentioned vehicles as original equipment. This applies at the moment only to Mercedes-Benz vehicles.

The new spark plugs are of the type "H" with 16 mm (5/8") width across flats. They are provided with a non-removable SAE connecting part.

Please note the maximum tightening torque when changing spark plugs

of 10 ... 20 Nm (1.0 ... 2.0 kgfm).

To avoid the serious consequences to the engine which can arise in circumstances where the conical seats are subjected to excessive stress, we recommend that a suitable torque wrench be used. Available from a specialist dealer or direct from the firm of:

HAZET-WERK
Herman Zerver
Postfach 101067/68
5630 Remscheid 1

is, for example, the HAZET 6110 - 1CT design with adjustable tightening torque (5 ... 60 Nm). To go with this HAZET also supply a simple wrench with part no. 880A MgT.

A suitable socket wrench HAZET 880A MgT1 is being prepared at the moment and will be available from Autumn. This wrench has a support shoulder on the outer diameter which at the same time centralizes the spark plug on the SAE connecting piece. In particular, we would like to draw your attention to the HAZET 880A CT-20 socket wrench with fitted tightening-torque limitation of 15...20 Nm. This will probably be available in Autumn.

Note for REGE/AV:

If you have difficulty in obtaining these tools in your country, you can order them from KH/VKD 4.

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MERCEDES-BENZ 240 D, 300 D

WDT-I-MB 036 En

Ed. 2, 8.1981

Engine shake during idle

Replaces Ed. 1, 11.1980

Correction

Complaints are being received regarding engine shake during idle on the above vehicles.

These complaints can be due to idle-delivery scatter between the different pump cylinders together with engine-specific tolerances.

In part, the engine shake can be reduced by lowering the idle-delivery scatter to 0.5 cm³/1000 strokes.

This special adjustment is to be charged to the customer.

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Mercedes Benz Passenger Car with Diesel Engine as of 8.80

VDT-I-MB 037 En
12.1980

Auxiliary starting device with
Glow-duration unit 0 333 402 505 (4-cyl.),...507 (5-cyl.)
Glow-duration unit from Striebel Co.
Glow-duration unit from VDO Co. } Daimler Benz
Sheathed element glow plug from Beru Co. service parts

For additional information see "New Product" VDT-I-333/3 En.

1. Test equipment

Voltmeter
e.g. ETE 014.00 0 684 101 400
Ohmmeter
e.g. ETE 014.00 0 684 101 400

2. Troubleshooting program

2.1 Aim of troubleshooting program
While making use of all appropriate test equipment, this program is designed to help workshop employees quickly detect causes of trouble on engines with a pre-heating system.

2.2 Test sequence

The test steps given on the left-hand side of the troubleshooting program contain test information and test specifications. If the test step has a negative outcome, consult the boxes on the right-hand side opposite for the corresponding repair instructions.

3. Workshop information

3.1 In order to prevent damage to the glow-duration unit and the sheathed-element glow plugs, the voltage applied during the pre-heating and starting phase must not exceed max. 12.5 V (e.g. use of fast charger or starting aid device).

3.2 If there is a short circuit in the power circuit the fuse strip (80 A), Part No. 1 191 017 003, blows.

3.3 If the fuel-injection pump is incorrectly adjusted, this may considerably reduce the service life of the sheathed-element glow plug.

3.4 In order to prevent the glow-duration unit from being irreparably damaged, the start repeater lamp must be fitted with a 12 V max. 3 W bulb.

3.5 For each repeat start the glow-plug and starter switch must, in order to obtain renewed pre-heating, first of all be turned to position 1 and then to position 2. This makes it possible for the safety switch-off circuit fitted in the glow-duration unit to be re-activated.

3.6 The glow-duration unit (Fig. 1) is accommodated in the engine compartment on the left-hand wheel house.

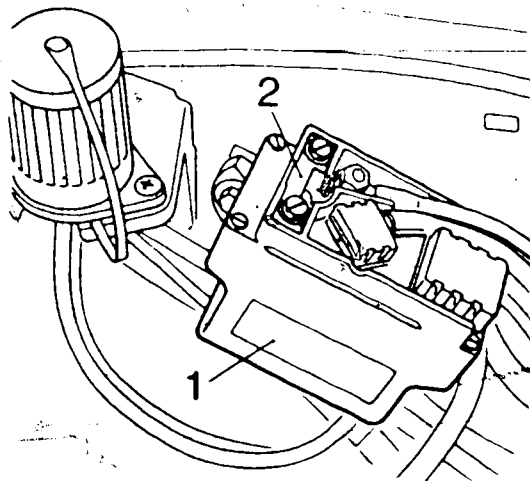


Fig. 1 1 = Glow-duration unit
2 = Fuse strip (80 A)

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Troubleshooting program

Before testing, make sure of the following:
Battery fully charged, compression O.K. (if necessary check compression loss),
fuel supply and fuel-injection system O.K.

Starting motor turns and engine fails to start or starts only with great difficulty.

yes

Check voltage supply to sheathed-element glow plugs.

Connect voltmeter to sheathed-element glow plugs one after the other and to ground.

Turn glow-plug and starter switch to position 1 and then to position 2. Voltmeter must indicate at least 10 V.

Caution: After at least 21 seconds the system switches off automatically. If the measurement has to be repeated then the glow-plug and starter switch must again be turned to position 1 and then to position 2.

Minimum voltage present?

no

Minimum voltage on all sheathed-element glow plugs not present.

1. Remove protective cap from glow-duration unit and check fuse strip (80 A), and replace if necessary.
2. Check cable from positive terminal of battery to glow-duration unit term. 30 for open circuit. Eliminate open circuit.

3. Check cable from positive terminal of battery via glow-plug and starter switch term. 15 to glow-duration unit term. 15 for open circuit. Eliminate open circuit.

4. Check ground cable from glow-duration unit term. 31 for open circuit.

Eliminate open circuit.

If Points 1-4 O.K., then replace glow-duration unit.

Minimum voltage on one or more sheathed-element glow plugs not present.

Check cable(s) from glow-duration unit term. G1...G5 to sheathed-element glow plug(s) for open circuit.

Eliminate open circuit.

If there is no open circuit, then replace glow-duration unit.

yes

Check start repeater lamp.

Turn glow-plug and starter switch to position 1 and then to position 2. Start repeater lamp must light up. Does start repeater lamp light up?

no

1. Check cable from glow-duration unit term. La, including start repeater lamp as well as its ground connection, for open circuit. Eliminate open circuit.

2. Check all sheathed-element glow plugs individually for open circuit. Replace defective sheathed-element glow plug(s).

If Points 1 and 2 O.K., then replace glow-duration unit.

yes

Continued on Page 3

Continued from Page 2

Check pre-heating time.
Turn glow-plug and starter switch to position 1 and then to position 2. The pre-heating time (start repeater lamp lit up) must be

approx. 6 seconds at an ambient temperature of 0°C

approx. 4 seconds at an ambient temperature of +20°C

approx. 2 seconds at an ambient temperature of +40°C.

Pre-heating time (seconds) O.K.?

no

Replace glow-duration unit.

yes

Check safety switch-off circuit.
Connect voltmeter to a sheathed-element glow plug and to ground. Turn glow-plug and starter switch to position 1 and then to position 2. The voltmeter must indicate voltage for

max. 40 seconds at an ambient temperature of 0°C to +40°C.

After the specified time the voltmeter must indicate 0 V.

Voltmeter at 0 V after specified time?

no

Replace glow-duration unit.

yes

Check glowing of glow plugs when starting motor is operated.

Connect voltmeter to a sheathed-element glow plug and to ground.

Turn glow-plug and starter switch to position 3 (starting).

Voltmeter must indicate a voltage of 6...10 V.

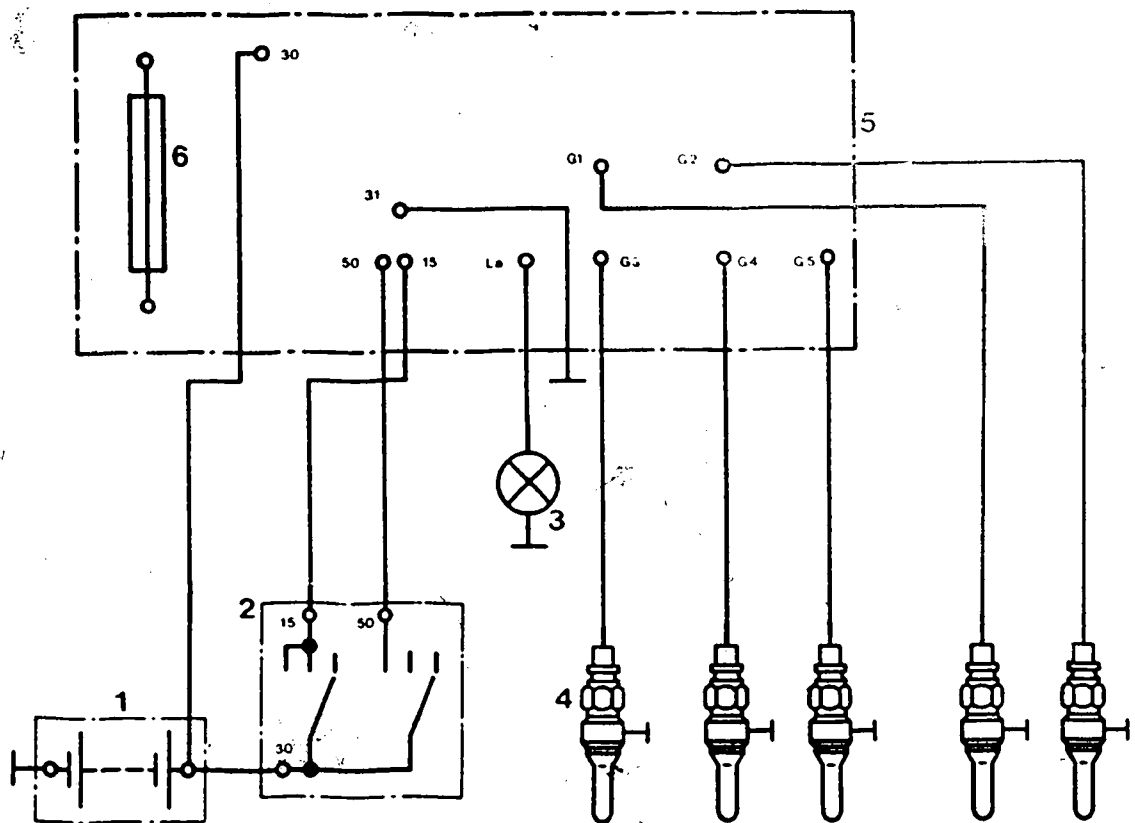
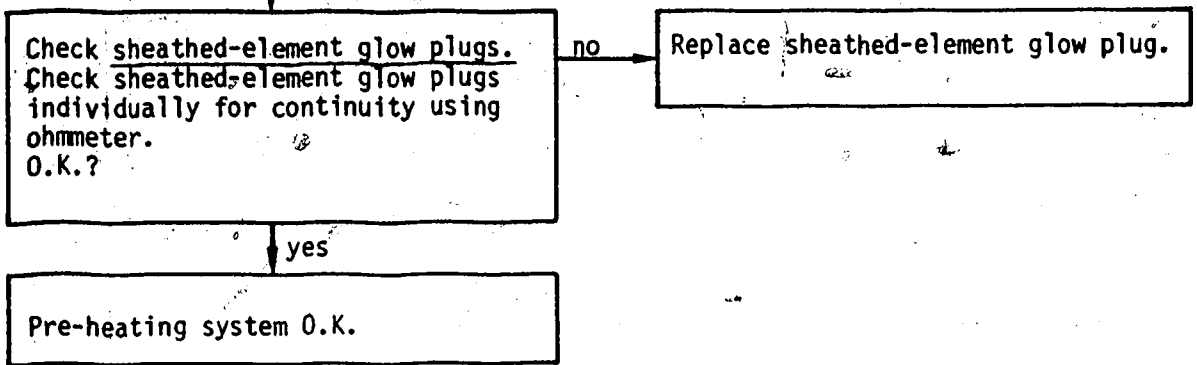
Voltage present?

no

1. Check cable from glow-plug and starter switch term. 50 to glow-duration unit term. 50 for open circuit. Eliminate open circuit.
2. If Point 1 O.K., then replace glow-duration unit.

yes

Continued on Page 4



- 1 = Battery
- 2 = Glow-plug and starter switch
- 3 = Start repeater lamp
- 4 = Sheathed-element glow plug
- 5 = Glow-duration unit
- 6 = Fuse strip (80 A)

Only for use within the Bosch organization. Not to be communicated to any third party.

MERCEDES-BENZ PASSENGER CARS

VDT-1-MB 038 En

with air bag and seat-belt tightener

3.1981

In accordance with customers' wishes Mercedes-Benz have been fitting vehicles of type W 126 since the end of 1980 with a new safety system, the air bag, on the driver's side and a seat-belt tightener for the front passenger seat.

Further vehicle types will be fitted with this system during the course of the year.

For this system Bosch deliver the:

Air-bag triggering device	0 285 001 001,
Energy reserve	0 285 100 004 and from mid-1981
Voltage transformer	0 285 001 003

The function and method of operation of the air-bag system are described in Technical Bulletin VDT-1-285/1 En.

Air-bag after-sales service

For safety and technical reasons after-sales service work on the still somewhat uncommon air-bag system will be undertaken by Mercedes-Benz for the time being. This arises as a result of the responsibility of Mercedes-Benz for the complete system, for which Bosch only deliver a few components.

Trouble-shooting and fault-eliminating work involve tasks (removing the seat, readjustment of the seat belt etc.) which are beyond the normal scope of trouble-shooting work and the elimination of faults.

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MERCEDES-BENZ

300 D - TURBO, 300 TD-TURBO

300 CD-TURBO, 300 SD-TURBO

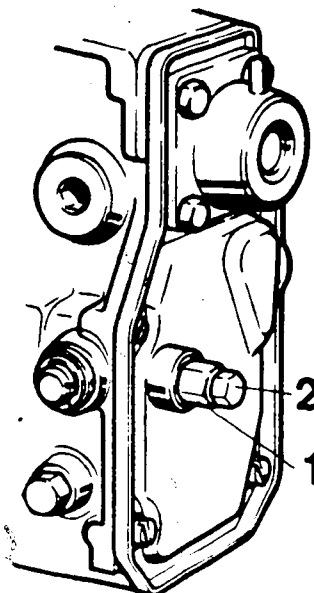
Transverse shaking of engine
in lower idle-speed range

Fuel-injection equipment

VDT-I-MB 041 En

11.1984

supersedes edition 7.1984



1 = Locking nut

2 = Setting screw

On the above-mentioned vehicles with fuel-injection pumps 0 403 245 .. (PES 5 MW.. with RW governor) there may be complaints due to transverse shaking of the engine in the lower idle-speed range.

Corrective action:

The transverse shaking can be eliminated by engaging the damper (friction brake) in the RW governor.

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G22

G22

The damper is comprised of a setting screw and a locking nut and is located in the governor cover (see Fig.). By forcing the setting screw up against the driver (reverse-transfer lever of the sliding sleeve and the variable-fulcrum lever) the damper prevents engine shake in the lower idle-speed range.

Setting:

Bring the engine to operating temperature.

Loosen the locking nut (1).

At idle speed ($750 \pm 100 \text{ min}^{-1}$), screw the setting screw (2) in until the shaking stops. Do not screw in beyond this point. Finally, tighten the locking nut (1) with a torque of $20 - 25 \text{ Nm}$.

Note:

Only screw the damper in this far because otherwise the idling characteristic of the cold engine will be adversely affected.

Should the above-described action not eliminate the transfer shaking, it is possible to achieve a further improvement by reducing the dispersion of the fuel deliveries at idle.

To do this, remove the fuel-injection pump and have the equal delivery of the pump newly set on a pump test bench at a BD diesel workshop (see Technical Bulletin VDT-1-403/100).

Responsible:

Robert Bosch GmbH

Division KH

Technical After-Sales Service (KH/VKD 2)

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MERCEDES-BENZ 300 TD-TURBO

(Type 123 and 126 with engine OM 617)

Incorrect start-of-delivery marking on bearing
end plate of fuel-injection pumps PES 5 MW ..

0 403 245 020 (USA)

0 403 245 022 (Europe)

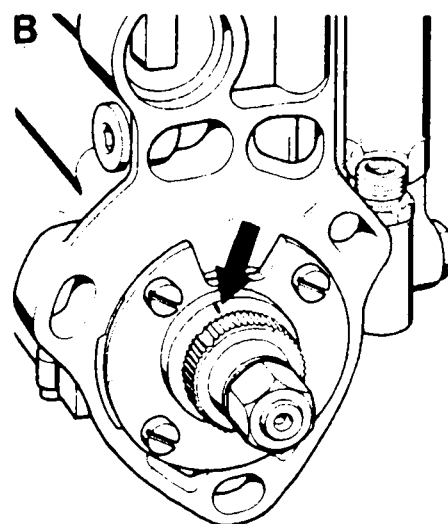
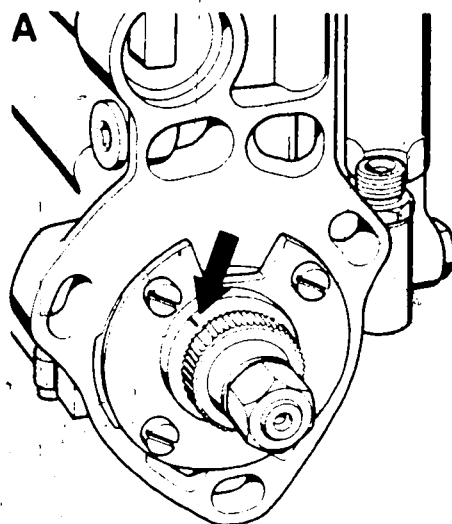
VDT-I-MB 045 En

4.1983

With some of the above mentioned fuel-injection pumps with FD 250 and FD 251
it is possible that the marking (arrow) for the start-of-delivery on the
bearing end plate is not correctly positioned.

Fig. A shows the correct marking on the bearing end plate (marking approximately
near the center of the bore for the upper-left fastening-screw of the bearing
end plate).

Fig. B shows the incorrect marking on the bearing end plate (marking to the
right of the bore for the upper-left fastening-screw of the bearing end plate).



Before the fuel-injection pump is fitted into the engine, it is important to see
that with the incorrect marking on the bearing end plate (Fig. B) the marking on
the driver of the cam shaft (missing tooth) must be turned three pinion teeth
further to the left of the marking on the bearing end plate.
The position of the engine for fitting the injection pump (1st. cylinder 24°
before TDC) as well as the testing or adjustment of the start-of-delivery
remain the same.

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Electrical Equipment

MERCEDES-BENZ 380/500 SE, SEC, SEL, SL, SLC VDT-I-MB 046 En

AS FROM 1982 MODEL 8.1984

Failure of the ignition-distributor rotor supersedes Ed. 11.1983

Ignition-distributor rotor 1 234 332 337 is fitted in the following ignition distributors:-

0 237 401 010, .. 012 4 0 237 405 024, .. 028

These ignition distributors are used in the above-mentioned vehicles.

Due to the high ignition energy of the breakerless transistorized ignition TCI-i (trigger box 0 227 100 042) the rotor electrode can burn off under unfavourable circumstances.

This results in misfiring and the engine stopping.

Remedy

Replace the defective ignition-distributor rotor.

The new rotors have the same part number, but also have a circular "0" mark on top and on the packing.

New ignition-distributor rotors have been available since September 1983.

The new rotor is fitted in the above-mentioned ignition distributors as from date of manufacture FD 348.

Warranty procedure

Please send your stocks of old and defective ignition distributor rotors with reference to this Service Information sheet via our representative in your country to:

Motor Vehicle Service Information



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G25

G25

F3 24 62

ROBERT BOSCH GMBH
KH/LAV-Auspackraum
Zur Weiterleitung an
K3/QSG
Postfach 410 960
7500 Karlsruhe 41
West Germany

This arrangement exists also until further notice for failures which occur after the warranty period has elapsed.

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Initiated by: K1/VAK

Motor Vehicle Service Information



Fuel-injection equipment

MERCEDES-BENZ 240 D, 300 D

VDT-I-MB 047 En

Bucking in vehicles with fuel-
injection pump PES..M with RSF governor

11.1984

supersedes Ed. 6.1984

In the above-mentioned vehicles there may be the nuisance of bucking during vehicle operation.

The situation is improved by installing a thicker idle-speed auxiliary spring (2.0 mm instead of 1.5 mm).

Conversion:

- Remove tensioning lever 1 422 031 016 (service-parts list Item 16.) with riveted-on idle-speed auxiliary spring as well as adjusting screw 1 423 412 017 (Item 52).
- Install new tensioning lever with thicker idle-speed auxiliary spring 1 422 031 026 and with likewise thicker adjusting screw 1 423 412 022.
- After converting, mark injection pump with red paint dot on governor housing (next to the pneumatic shutoff box).

Setting on pump test bench:

As a result of this modification the full-load setting point shifts from $n = 2200 \text{ min}^{-1}$
to $n = 2100 \text{ min}^{-1}$.

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In addition, test point 5 in the test-specification sheet under Section B in columns 1 - 3 is also deleted.

In the text part of the test-specification sheet under point 2 "Setting the idle control-lever position", the test speed changes

from $n = 1000 \text{ min}^{-1}$

to $n = 1100 \text{ min}^{-1}$

This conversion is subject to payment.

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Motor Vehicle Service Information



Fuel-injection equipment

MERCEDES-BENZ 200 D, 240 D, 300 D

VDT-I-MB 048 En

Sticking of shutoff boxes on fuel-injection
pumps PES..M.. with RSF governor and
PES..MW.. with RW governor

5.1984

In some of the above-mentioned vehicles it is possible
for the control rod to stick.

The cause may be a defective shutoff box with unequally
bent guide rails or a rivet head which is too large.

In case of complaint:

"Control rod sticking", before removing the injection
pump first of all check the shutoff box for the above-
described faults and renew if necessary.

The fault on the shutoff box may possibly only be de-
tectable if a lateral force is exerted on the drive
hub.

Due to appropriate measures in series production the
above-mentioned faults no longer occur on assemblies
as of FD 350 (Oct. 1983).

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Electrical Equipment

BULB FAILURE INDICATOR
Installation of auxiliary lighting
equipment, trailer socket etc

VDT-I-MB 050 En
6.1985

Daimler-Benz vehicles type W 124 (since start of production) and types W 126 and R 107 (as of mid-85) are equipped with a bulb failure indicator (not a BOSCH product) for the entire outside lighting.

If auxiliary lighting equipment is retrofitted, such as trailer socket or similar, this auxiliary equipment must not be connected between bulb-monitoring unit and bulb since this will adversely affect the operation of the bulb monitoring system and/or the bulb-monitoring unit may be destroyed.

Interventions may be made before the bulb-monitoring unit in the usual manner.

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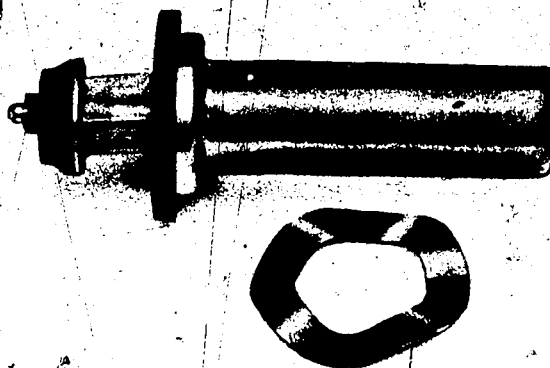
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Electrical equipment

VDT-I-MB 052 En

12.1985

MERCEDES-BENZ PASSENGER CARS WITH
HEATING AND AIR-CONDITIONING CONTROL
Repair kit for heating-water valve



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For MB passenger-car models W 123, W 126, C 126, R 107 with heating and air-conditioning control (optional extra) there is a repair kit 1 147 213 007 for mono/ duo heating-water valves (see picture). The kit contains

1 tractive electromagnet

1 147 213 005

1 wavy spring

1 140 150 002

The repair kit makes it possible to repair mechanically defective mono or duo heating-water valves.

To repair, it is not necessary to remove the complete heating-water valve assembly from the vehicle.

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H3

43
En 64

Repair of mono and duo heating valves

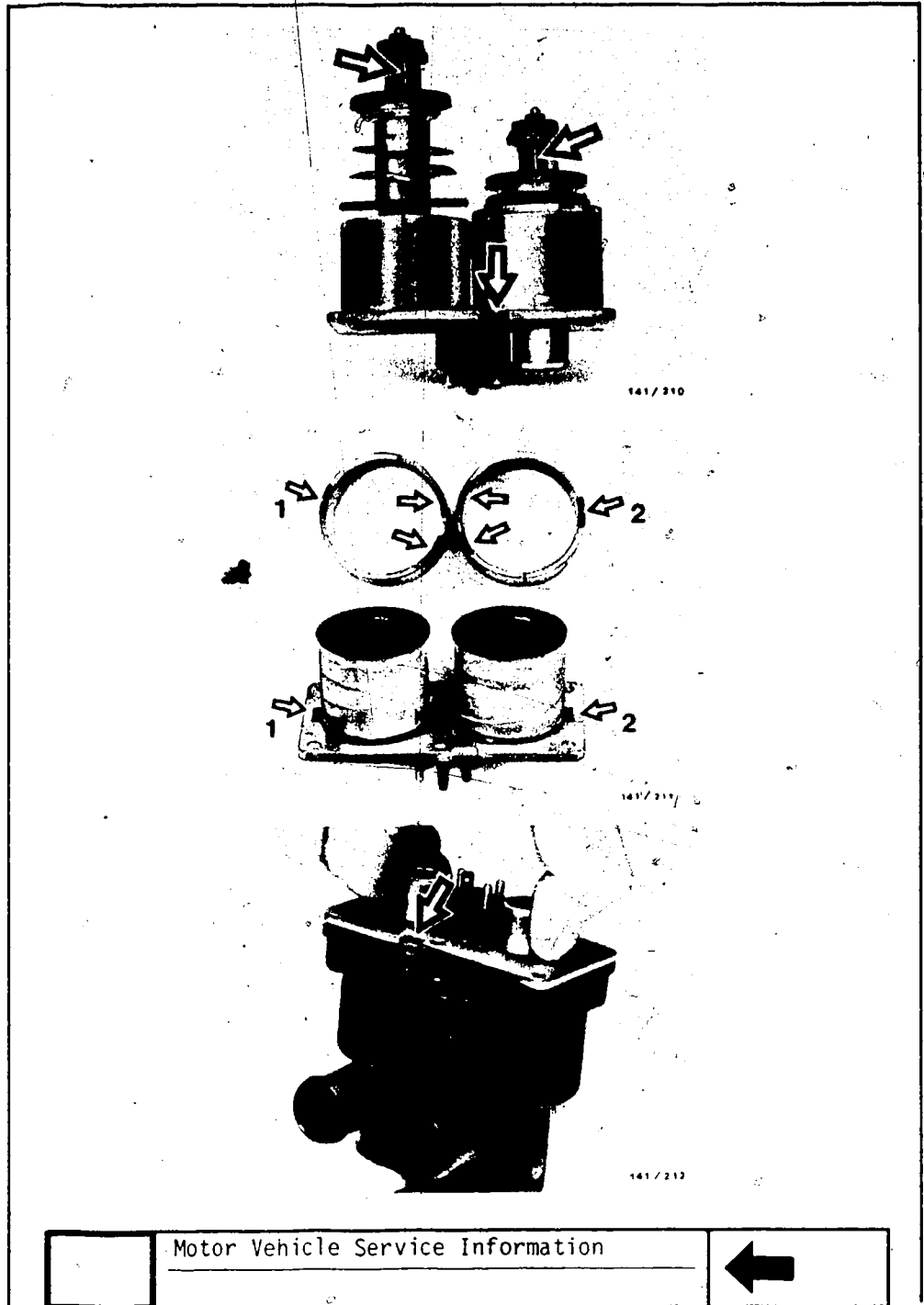
N o t e :


Do not carry out work with cooling system hot!

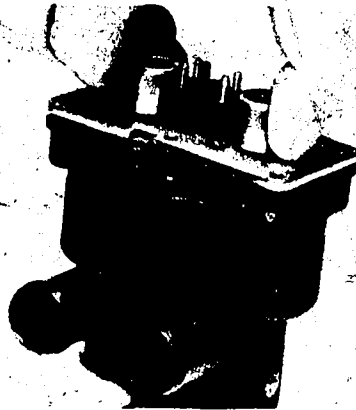
1. Release pressure from engine cooling system (open radiator cap).
2. On vehicles with flat-type heat exchanger under the windshield: disconnect hose from port to heat exchanger.
3. Disconnect electrical connection from heating valve.
4. Unscrew the 4 or 6 screws of the cover plate.
Cover plate is slightly raised by action of spring.
5. Lift out valve insert - by the tractive electromagnets (chrome sleeves) only - as shown in the illustrations on the right. If the valve insert is removed by the cover plate, it is possible for the connecting wires of the winding to break off.
6. Pull tractive electromagnets (chrome sleeves) out of the windings, while holding protective rings of windings with plain washer.

Motor Vehicle Service Information

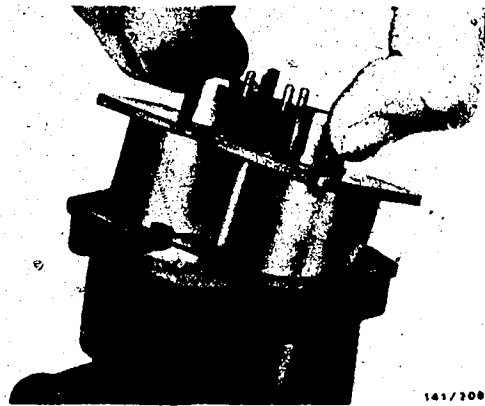




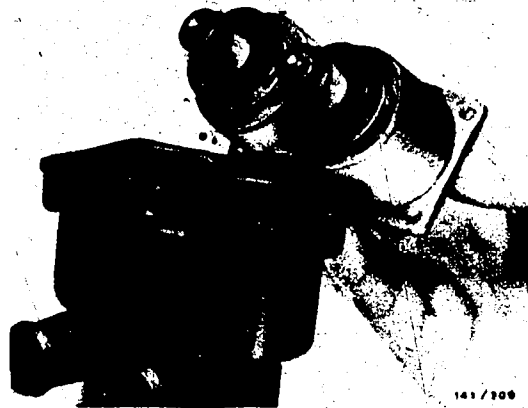
	Motor Vehicle Service Information	
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Motor Vehicle Service Information



7. Fit plain washers and yoke discs onto the new tractive electromagnets (chrome sleeves), being sure to use the new, enclosed wavy disc (top picture).
8. Ensure correct seating of protective rings around the winding. The 3 grooves of the protective ring must latch on the cover plate (center picture, arrows).
9. Insert tractive electromagnets (chrome sleeves) with washers into windings. Turn seam of strainer so that it points to the groove on the cover plate or, on mono valves, in the same direction of inlet and outlet (top picture, arrows). Operate lifting unit once by hand.
10. Check valve seats in plastic housing for residues or damage to sealing surfaces.
11. Holding the valve insert by the tractive electromagnets (chrome sleeves) only (see bottom picture), insert into plastic housing. Lug on plastic housing must fit into groove on cover plate (bottom picture, arrow).
12. Screw down plate.
Check electrical connection; if necessary, clean sockets and bend.
13. Perform leak test on cooling system.
14. Check automatic heating system or air conditioner for correct operation according to vehicle owner manual.

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